

THE
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AMERICAN REPERTORY

OF

ARTS, SCIENCES, AND MANUFACTURES.

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AMERICAN HISTORY

THE HISTORY OF THE UNITED STATES

CHAPTER I

THE FIRST SETTLEMENTS

The first settlements in America were made by the Spaniards in the year 1492. They were followed by the French, the Dutch, the Swedes, the Germans, the Irish, the English, and the Americans.

1776

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INTRODUCTION.

TIME-honored custom, from whose dictum we see no reasonable cause to dissent, has made it matter of courtesy to say a few preliminary words in explanation of the plan and principles upon which a new periodical work shall be conducted, and of the pretensions which it makes to public encouragement. This has already been done as extensively as was consistent with the brevity of a Prospectus; but the subject is capable of repetition, with a few explanatory details, and to some of the readers of the Repertory it may be altogether new.

The time, we hope, has for ever gone by, when those who were actively engaged as artizans, mechanics, manufacturers, or artists, were contented to obey mere directions, or to follow beaten tracks, in the performance of their avocations, without any curiosity as to the laws by which their several operations were guided, or the principles upon which they were founded. The march of science is now giving fresh improvements to art, and the progress in art affords continual stimulus to science. So rapid is the increase, and so general the desire, for the acquisition of that knowledge which can be turned to a practical account and add new benefits and conveniences to the community, that there is scarcely even a laborer, in town, or field who is so supine as to go through his daily tasks, in their monot-

onous succession, without a wish to ascertain the grounds and the effect of that on which he is employed.

But if this laudable curiosity be so generally excited among even the least informed of our fellow men, how much more must that ardent desire exist in the minds of those who, in their numerous nice operations and appliances, are compelled to perceive that there are certain fixed laws in nature from which they cannot depart, but which will admit of wonderful modification, at the hands of those who shall have made themselves acquainted with the properties, qualities, and capabilities of matter generally, and particularly of such descriptions of matter as those upon which it is their business to be engaged.

The desire of information which in the course of the last thirty years has received an impulse that is without a parallel in the history of mankind, has been followed up with an energy and a practical benefit in our own country, which has far outstripped that of any other; and the free discussions, the beneficial result of our free institutions, have given vigor to research. The consequence has been, that in all the useful arts, and the sciences connected therewith, we may proudly consider ourselves as not inferior to any people whatsoever. There are, however, certain points of this description, in which aid has not been sufficiently given, and it is the object of this Periodical to supply in some degree the deficiency.

The science of mechanics has scarcely hitherto been possessed of a journal dedicated chiefly to its peculiar interests; whilst on most other subjects, continuous publications are issued containing the new lights thereon from time to time elicited. These publications are prime conductors to improvement, giving experience of the past and leading to the successful future. But the laws of mechanics are of universal application, and the exposition of these, therefore, which seem to have been postponed for all others, ought to have had the earliest consideration. It is impossible to set bounds to conjecture, as to the degree of eminence the mechanic arts might have reached by this time, if the rationale of the application of science thereto had formed a portion of the business in learning a mechanical business heretofore. It is becoming so now, however, and henceforth

the artizan, worthy of the name, will be likewise a geometri-
cian, a chemist, an artist, or a person conversant in literature.
He *may* be all these, he *must* be one or more of them, in order
to hold his standing amongst the more estimable of his brethren ;
for, as the march of knowledge is onward, he cannot afford to
remain in the rear of those who are competing with him in the
race of eminence and the field of emolument.

It is an universal admission that "example is better than
precept ;" accordingly, records of transactions, and descriptions
of discoveries or improvements, more closely attract attention
than the truest of theories given in abstract terms. The latter
however, are essentially necessary, in order to test the correct-
ness and true value of the former. Theories therefore will oc-
cupy a due portion of this work, as containing the bases upon
which useful superstructures should be erected. But, inasmuch
as emulation is chiefly excited by the *acts* of others, and every
known improvement is but the stepping stone to another, it is
believed that the minute and circumstantial details of valuable
patents will be found greatly acceptable to all who shall feel
interested in a work of this kind. It will do justice to the in-
genuity and skill of those who thus distinguish themselves ;
whereas a garbled account, or an extract from a portion of
those details, is calculated to mislead the reader as well as to
fall short in what is due to the author of the patent. In like
manner, reports of the transactions of societies have a most
salutary influence in communicating various minute points of
information which, without them, might fall silently as regards
the public, for an indefinite term.

These are the considerations which stand foremost, in set-
tling the design of the "Repertory ;" there are many others sub-
ordinate thereto, which can as easily be developed in the course
of its procedure before the public, as by any formal descrip-
tion ; but it may nevertheless deserve a passing remark that the
importance of clear illustration will always be kept in view,
and particularly that diagrams, figures, drawings, and their se-
veral marks of reference, will be executed with the most severe
care and clearness that the nature of the press-work can by
possibility permit. This, next to a perspicuous text, is perhaps

one of the greatest helps to a true understanding of mechanical and philosophical subjects, and for the want of proper attention in it nothing can atone.

Original papers and treatises on all subjects connected with the arts, experimental philosophy, and even of abstract literature, will find places in the "Repertory," on fitting occasions. An agreeable variety of subjects tends to keep up the relish for them all, whilst a clogged monotony is calculated to render unpalatable even that which in itself is useful.

Among the original features of the present work it is trusted that one of no small importance will be found in the reports of the conversational meetings of the Mechanics' Institute. It is worthy of remark that we are more apt to treasure up a passing observation of a shrewd nature, or the leading points in a familiar conversation, than those which form parts of a set and formal discourse. We seize upon them as truths uttered unpremeditatedly, and they carry conviction and clear perception as they fall from the speaker, as, at such times each one who ventures on a remark is anxious to give his best experience, and, from practical men, all experience is valuable.

One thing only remains to be touched on here; it is that of punctuality. Nothing has a greater tendency to destroy the desire of information than that of defeated expectation; and it is especially the duty of a careful manager that periodical works appear strictly at their wonted times. The readers therefore of the "Repertory of Arts," may feel assured that, with every care to make the contents worthy of deliberate perusal, the work shall appear duly on the first day of each successive month. With this promise we now address ourselves to duty.

GEOLOGICAL REPORTS.

WE have received during the past and preceding years Geological Reports from several States, including New-York, which we have read with much interest and gratification. As the fourth and last annual report of the survey of New-York will be presented to the legislature by the first of February, 1840, we have prepared a brief notice of those heretofore made

upon this subject, and have also added a reference to similar surveys now in progress, or which are completed, in other states of the Union. As these reports have doubtless been perused by such of our readers as take an interest in these matters, and in the subject of internal improvements generally, we do not think it necessary at this time to go into an examination of the various subjects treated of by the geologists; indeed our present time and space will not allow of more than a bare notice of the reports that have been made thereon. In some future number we may be able to furnish a review or examination of the subjects embraced in these reports, and of the practical results of the geological survey of the state, which are justly considered to be of the highest importance to the arts, to agriculture, and to the cause of science generally.

Some of the states have been already surveyed, viz: Massachusetts, New Jersey, and North Carolina.

The following are now in the progress of survey, viz: New York, Connecticut, Maine, Pennsylvania, Maryland, Virginia, and Michigan.

Partial and preliminary surveys have been made of Ohio, Kentucky, and Indiana.

Geological surveys have been projected or authorized by the legislatures of South Carolina, New Hampshire, and Georgia.

STATE OF NEW-YORK.

THE following extract from a communication by the Governor to the Assembly, February 27, 1839, accompanying the third geological reports, will shew the nature of the survey ordered for this state. "By an act of the Legislature, passed on the 15th of April, 1836, the Governor was authorized and directed to employ a suitable number of competent persons, whose duty it should be, under his direction, to make an accurate and complete geological survey of this state; which survey should be accompanied with proper maps and diagrams, and should furnish a full and scientific description of the rocks, soils, and minerals of the state, and of its botanical and zoological productions, together with specimens of the same. It was further provided, that such maps, diagrams, and specimens,

should be deposited in the state library, and that similar specimens should be deposited in such of the literary institutions of the state as the Secretary of State should direct."

"The act appropriated \$26,000 annually, during four years, to defray the expenses to be incurred, and directed that the person or persons who should be employed should annually make a report to the legislature before the first day of February, setting forth generally their progress in the survey."

By the preceding extract it will be seen that the survey of the state of New York is of a most comprehensive nature, including not only an examination and collection of the rocks, minerals, and soils, but also of the plants and animals of the state, so that the complete reports will present a full account of the natural history of the state of New-York.

The appointments were made by the Governor according to the above resolution ; the first annual reports were made to the legislature on the 11th of February, 1837, and form Assembly Document 161, two hundred and twelve pages. We have not time or space here to enter upon an examination of these reports, which are mostly of a general and preliminary character, and have no doubt been perused by most of our readers. These reports were as follows :

Report of *Dr. John Torrey*, on the botanical department of the survey.

Report of *Dr. James E. Dekay* of the zoological department of the survey.

Report of *Dr. Lewis C. Beck*, on the mineralogical and chemical department of the survey. This treats chiefly of the ores of iron, lead, and zinc.

Report of *W. W. Mather*, first geological district, containing general and useful remarks upon economical geology, as coal, lime, iron ores, clay, sand, &c.

Report of *Professor E. Emmons*, second geological district, treating of the topography of this district, and of the ores of copper, lead and iron.

Report of *T. A. Conrad*, third geological district, containing general remarks upon the rocks of this district, and upon salt, plaster, hydraulic limestone, &c.

Report of *Lardner Vanuxem*, fourth geological district, containing general remarks upon the rocks of this district, which underlie the coal measures of Pennsylvania.

The second annual reports were transmitted by the governor to the Assembly on the 20th of February, 1838, and form Assembly Document 200, three hundred and eighty four pages. They consist of—

Letter from *James E. Dekay*, the zoologist, in relation to annual reports from the zoological and botanical departments.

Report of *Dr. Lewis C. Beck*, on the mineralogical and chemical department of the survey. Containing a general and condensed account of the mineral waters of the state, including the Brine Springs of Salina and Montezuma, with a tabular view.

Report of *T. A. Conrad*, on the palæontological [or fossil] department of the survey. The rocks of the state of New-York are arranged in groups, with a list of their characteristic fossils.

Report of *W. W. Mather*, first geological district. Containing the economical geology of Queens, Kings, and Richmond counties, also of Columbia and Dutchess counties, and treating of marl, limestone, marble, and ores of iron, lead, and zinc.

Report of *E. Emmons*, second geological district. Containing examination of the counties of St. Lawrence and Essex—granite, limestone, sandstone, and various ores, heights of mountains, &c. with wood cuts.

Report of *Lardner Vanuxem*, third geological district. Containing economical geology of the counties of Montgomery, Herkimer, Oneida, Oswego, and describing limestones, sandstones, gneiss, &c. with characteristic fossils.

Report of *James Hall*, fourth geological district. Containing geology of the Genesee river, and details of Wayne, Monroe, Orleans, and Niagara counties, treating of limestone, gypsum, sandstone, iron ores, salt springs, &c.

These reports are accompanied by an atlas of maps and lithographic views, illustrating the geology of the third and fourth districts.

The third annual reports were transmitted by the Governor to the Assembly, on the 27th of February 1839, and form As-

sembly Document 275, three hundred and fifty one pages. They consist of—

Report of *Dr. Lewis C. Beck*, on the minerological and chemical department of the survey. Containing tabular views of the minerals of the state, and remarks upon marble, hydraulic or water limestone, gypsum, porcelain clays, ores of iron, manganese, lead, titanium, arsenic.

Report of *T. A. Conrad*, on the palæontological department of the survey. Containing a tabular arrangement of the rocks in groups, with characteristic fossils, and descriptions of new fossils.

Report of *W. W. Mather*, first geological district. Containing economical geology of New-York, Westchester, Putnam, Rockland, and Orange counties, granite, limestone, marble, iron ores, &c. In appendix are report of *W. Horton* upon the county of Orange, and report of *L. D. Gale* upon the county of New York.

Report of *E. Emmons*, second geological district. Containing an account of Hamilton, Clinton, and Warren counties, and treating of porcelain, clay, jasper, peat, black lead, &c.

Report of *Lardner Vanuxem*, third geological district, treating of sandstone, water limestone, gypsum, salt springs.

Report of *James Hall*, fourth geological district, describing the geology of Seneca, Ontario, Yates, Tompkins, and Chemung counties.

Part of the collections made during this survey are arranged in two upper rooms of the capitol at Albany. The rest are in boxes waiting the decision of the legislature as to their final disposition. Eight suites of rocks and minerals have been collected by the geologists.

We cannot enter, in the present number, into an examination of the contents of these reports, or even to present our readers with any extracts. We presume that they have been read with interest by most of our citizens. The subjects are too extensive, and the facts and observations too numerous to allow of anything but a simple reference to them.

In these reports we are presented with full and authentic accounts of all the useful minerals of this state. Quarries of

limestone, marble, and granite, are pointed out and made known; the extensive deposits of plaster and water limestone are fully described; and the numerous and valuable beds of iron ore, lead, &c. are fully and fairly treated of. From these reports we see that Essex and Clinton, in the northern part of the state and Orange and Dutchess counties on the river side, are peculiarly rich in iron ores. A full and interesting account of the salt springs, which are a prominent source of income to the state, is contained in the second report from Dr. Beck. At his suggestion the legislature of 1838 made an appropriation for the purpose of boring for salt water, and for determining whether rock salt exists in the state. This boring was made in 1838, and the results, as stated in Dr. Vanuxem's last report, were, that a depth of 550 feet had been attained, but that the brine was no stronger, and that no rock salt had been met with.

Although no new discoveries of great practical value should be made in the course of this survey, these reports will be valuable in presenting an authentic and connected view of the mineral wealth of the state. From these documents we learn that New-York is especially rich in iron, salt, plaster and marble. Limestone abounds; numerous quarries of granite are pointed out in the counties adjoining the Hudson river, and are declared by Mr. Mather, the geologist of that district, to be of great value and immediately available.

The proper coal-bearing rocks do not appear to occur in this state, and although both anthracite and bituminous coal are found in small seams and cavities at various localities, the quantity is too small to warrant exploration. We hope that these reports will put an end to the fruitless and delusive search for coal; for although black, shining, and glazed slates occur in abundance along the Hudson river, from West Point to beyond Albany, and sometimes greatly resemble coal, yet they uniformly possess a character which is fatal to their use as fuel, namely, they are *incombustible*.

Several mines of lead ore have been opened, and are now wrought in St. Lawrence and Sullivan counties; but the question of their proving profitable or losing concerns is left in an undecided state by the geologists.

Silver mines, so called, have been opened and worked in various parts of the state, at the great cost, and even ruin of the believers in mineral rods, as well as of the ignorant pretenders who use them; the geologists have visited and examined all these places, and find the ore, if there be any, to be nothing but sulphuret of iron, called iron pyrites, which, in such small quantities as are found at these mines, is utterly worthless. Where it appears in extensive beds it is called "copperas ore," and is used for the manufacture of that article.

Copper ores occur in several parts of the state, but not in sufficient abundance to warrant working the mines.

The botany of the state is entrusted to *Dr. John Torrey*, and the zoology to *Dr. James E. Dekay*; and we are satisfied that these subjects will receive full justice at the hands of these gentlemen. Indeed a better selection could not well be made, than that of the persons engaged in this important work.

We have in this notice called the attention of our readers to some of the subjects of economical and practical value contained in these reports, and cheerfully recommend their full perusal to all those who take an interest in the subject of internal improvement, and the developement of the resources of the state. Much scientific matter is also presented in connection with these general subjects, such as the age of the New-York rocks, their continuity with those of other states, and their identity with the rocks of the other continent; but as the scientific matter is intended for the final report, and will be contained therein, we shall not refer to these subjects at the present time. We anticipate with much interest the fourth and final reports, and hope to be able upon their appearance to present an extended notice of their contents.

In our next we shall proceed to notice the reports which have been received, concerning the other states mentioned at the head of this article.

(TO BE CONTINUED.)

[For the American Repertory]

On the magneto-electric spark and shock, and electro magnetic rotations. By W. H. GOODE, Chemical Assistant in the laboratory of the University of the City of New-York.

THE ordinary method of exhibiting the reactions of electricity and magnetism, is to cause the armature of an electro-magnet, wrapped with insulated copper wire, to rotate before the poles of the magnet, and to interrupt the circuit formed in this wire at the moment the polarity of the armature is reversed. A spark is seen, a shock can be received and decompositions can be effected at the point of disjunction. As comparatively little interest is manifested towards the study of these phenomena, few institutions are provided with the apparatus necessary to a full experimental illustration of the laws which they obey. Recent experiments, conducted with a view of employing electro magnetism as a motive power, are bringing it and its kindred branches of science more into notice. It may not therefore be useless to state some methods more simple than those in common use, of exhibiting the most striking experiments connected with these subjects; and to give some reasons for the hitherto unsuccessful application of electro-magnetism to the movement of machines.

A silk-covered copper wire $\frac{1}{12}$ th or $\frac{1}{16}$ th of an inch in diameter, and thirty feet in length, should be formed into a helix, capable of admitting into its axis a cylinder of soft iron, one inch in diameter. On connecting the helix with a single voltaic pair, exposing a square foot of surface, no spark will be observed when contact is made, and a feeble one when it is broken. If the cylinder of soft iron be inserted into the helix, a brilliant spark, accompanied by an audible snap, will be perceived at the moment of breaking contact. Shocks will be received if the ends of the helix be grasped with wet fingers and contact be broken. They are more violent if two metallic cylinders, which when grasped are in contact with a large surface of the wet hands, and adjusted to the helix near its ends, or dip into the cups of mercury which connect it with the battery.

Decompositions can also be effected, by replacing the handles with wires suitable for that purpose.

Where silk-covered wire cannot be procured, it may be dispensed with, by separating the convolutions of the helix so that they shall not touch each other; the pasteboard or wooden tube on which it is usually formed is also rendered needless, by winding the wire on the cylinder of soft iron previously coated with sealingwax.

To procure very striking results, it is only necessary to enlarge certain parts of the apparatus; the others at the same time admit of being diminished in their dimensions. Professor Jacobi [Scientific Memoirs, Part 4, pp. 350] obtained a brilliant spark, and received a violent shock, from an arrangement consisting of an electro-motor of one pair of plates, exposing half a square inch of surface, and a helix formed of 400 feet of coated wire about $\frac{1}{8}$ th of an inch in diameter, which admitted into its axis a bar of soft iron $1\frac{1}{2}$ inches in diameter. On grasping the handles of this apparatus with wet hands, and breaking contact, the shock was so severe that it could scarcely be borne. By employing an electro motor, of a single pair of plates, exposing about two square feet of surface, and a helix formed of six feet of insulated copper wire $\frac{1}{8}$ th of an inch in diameter, which admitted into its axis a rod of soft iron $\frac{1}{4}$ of an inch in diameter, I have obtained a brilliant spark, and a shock through one hand.

An experimenter, therefore, can consult his convenience as far as regards the dimensions of the parts of his apparatus. A pair of plates exposing a large surface can be employed in connection with a small helix made of a short wire; or the surface of the pair may be diminished, and the diameter of the helix and that of the soft iron enlarged, and the wire lengthened. Professor Faraday has given a method of procuring the magnetic spark, which dispenses with the use of the voltaic pair and the temporary magnet. On the end of a pasteboard tube through which a cylindrical magnet could freely move, twenty feet of silked wire wrapped, forming a ring helix. A small amalgamated copper plate was fastened to one of its ends, the other being bent so as to pass the end of the tube, and touch this

plate perpendicularly on its flat surface. The spark was perceived at the point of disjunction, whenever the magnet was pushed quickly through the tube and separated the end of the wire from the surface of the plate. A piece of wood should be attached to the end of the magnet, that the wire, and the plate may be separated at the moment it is passing through the helix, that being the most favorable condition of the apparatus.

Magneto-electricity is generated when a piece of soft iron becomes a magnet, and when it parts with its magnetic property. These currents are momentary, being mere waves of electricity which pass in opposite directions. The rotations of a magnet in the vicinity of a conducting wire produce, in that wire a continuous current, of high intensity, which varies in quantity with the velocity of rotation. These two facts are the main obstacles to the profitable application of electro-magnetism as a motive power. A magnet or system of magnets actuated by a voltaic current, of a certain quantity, gives rise to a current flowing in the opposite direction to that of the motor, and consequently diminishes its effect. Increasing the dimensions of the voltaic pair produces no permanent acceleration of the velocity of the rotating system; for the same means employed to increase the velocity, in the same ratio adds to the quantity of the opposing current. These results have been obtained by professor Jacobi, [Scientific Memoirs, Part 4, pp. 528-531,] who measured with a galvanometer, the current circulating through his electro-magnetic machine, both before and after its motions were allowed to commence. In the former case, it was nearly one fourth greater than in the latter; the quantity of the magneto-electric current was therefore equal to nearly one fourth of that generated by the plates. Increasing the velocity of rotation, by mechanical means, was found still further to diminish the amount of electricity circulated by the battery.

Although the magneto-electric current possesses an intensity which under favorable circumstances enables it to decompose water, it cannot pass through a thick stratum of that fluid. By employing a motor battery, consisting of a number of alternations of pairs of plates, the length of the interposed liquid con-

ductor hinders the passage of opposing currents, but allows the full effect of the voltaic current to be obtained. With a battery consisting of twelve alternations, a force equal to half that of a man can be exerted; more recently a battery, one of whose elements was twenty square feet of platina, propelled a boat on the Neva. *L. & E. Phil. Mag. for Oct. 1839.*

These experiments only show the difficulties to be overcome before electro-magnetism can be successfully and profitably applied to mechanical purposes. The immense force generated by the solution of a few grains of zinc has only served to exemplify the laws obeyed by an imponderable agent, a correct knowledge of which may yet enable the mechanist to govern its effects at will.

University of the City of New-York, Dec. 11th, 1839.

[For the American Repertory.]

THE ART OF BUILDING.

BY JAMES FROST.

No. I.

THE present age may be clearly and honorably distinguished above all others, by the great improvements effected in many of the useful arts, and for its advancement in science. But among those brilliant achievements, may it not be questioned whether that art, so essential to the comfort, security and well-being of mankind—the art of building—has advanced in as great degree as many others; and whether it is not susceptible of great and immediate improvement?

As the promotion of the useful arts is to be a prominent object in your forthcoming work, I am induced to submit to you this first of a short series of essays, or proposed improvements, in the art of building; many important branches of which are at present greatly behind the state in which they ought to be.

A very curious and wide distinction may be drawn between the motive principles of architects and of civil engineers; the

one class being ever stationary, copying, depending on, and imitating what has already been done in their art; the other always progressive, enquiring, and endeavoring at improvement. In consequence of these different motives, we compose better copies of Grecian temples and other structures, than our ancestors; but do these copies satisfy the real wants of the present age, or correspond with the general advancement in art? Something better than mere copies from any age seems to be in continual requisition, and we ought to be in advance of all previous ages.

We have a case in point, in that mighty instrument, of modern improvement, the steam engine; the most ancient of which on record we derive from the Greeks in the engine of Ctesibes, which some persons have not hesitated to introduce and to recommend to public notice; yet how puerile, how contemptible is it, when placed in comparison with those of modern invention! Can it then be unfair to inquire, why our *builders* may not as far surpass those of the ancients as our *engineers* have so successfully done? and may not great improvements be anticipated from the assistance which builders may derive from engineers, and from that almost creative class—the modern chemists?

The continual destruction of buildings by fire, the immense loss thereby of property, and frequently of life, by the most horrible of deaths, the consequent continual anxiety, suffering, terror, and frequent destitution of large portions of the community, indubitably prove that the practical art of constructing secure buildings has not yet been attained; while the want of such art, being a great private as well as national loss, is positively disgraceful to the age.

The progress to a better and sounder system has doubtless been delayed by a reliance on fallacious and inadequate means of security; and the many attempts to palliate these evils, instead of at once boldly attempting a radical cure of them, have proved, when tested, unsatisfactory and delusive. Of this we have had frequent instances in the combustion of buildings termed *par excellence*, *fire proof*; the carcasses of which on examination have been generally found the most combustible in existence.

That we possess unfailing remedies for these evils is undeniable, provided we have the prudence to anticipate them; the skill to select the enduring mineral substances, so abundantly furnished by Providence for these important purposes; and the industry and perseverance to apply them to use.

Now it is the purpose of this essay to show that the judicious application of these neglected beneficent productions will in all cases be highly efficient, and that generally they will be more advantageous than the employment of vegetable materials, so much used and abused; the latter being the efficient and sole causes of the grievous misery and sudden destitution so afflicting to the present generation, and, by greatly delaying the improvement of the country, through the misapplication and unnecessary destruction of capital, impoverishing even future generations.

In building it should ever be borne in mind that timber, so destructible by fire, is also from many natural causes subject to early and certain decay, within a period in which sound mineral buildings will endure, free from the slightest deterioration; and hence, when, as we often see, no expense is spared on *exteriors* of marble or granite of the most elaborate workmanship, the *interiors* of such enduring and splendid structures are formed of wood—the true emblem of decay and of conflagration—what melancholy reflections arise from these contradictions, so discreditable to the age.

The construction of combustible or incombustible buildings affects not individuals only, but cities and nations in no trivial degree, with weakness, dependence, insecurity, and disgrace; or with strength, independence, security, and honor. What weak points are combustible cities in war! how incapable of defence! how open to insult and aggression, inviting to the attack of steam or rocket batteries!—how secure, how invulnerable would incombustible cities be in similar circumstances, how free from apprehension, how proud the inhabitants!

Great and desirable as are these advantages, mineral buildings will yet secure others, second only, if at all inferior, to the preceding.

We desire the protection of buildings, not only from the rava-

ges of fire, but also from the ever varying vicissitudes of the seasons ; we constantly need a genial temperature in our dwellings, in order to preserve serenity of mind, bodily comfort, continuance of life, and health ; all of which blessings are miserably hazarded or dearly purchased in slight and insufficient buildings ; and, that life itself is fearfully sacrificed in them, is fatally evidenced in the extensive prevalence of consumption.

That dwellings may be constructed that will maintain a more equal temperature, free from the train of annoyances now experienced, and consistent with ease and true economy, will be hereafter apparent.

That incombustible buildings were known and highly valued by ancient civilized nations is proved in the numerous splendid remains ; evidences alike of the preference in the choice of materials, and of proficiency in their construction, which as yet are unattained by modern artists, and are not attainable without great energy of pursuit, and study of the inherent qualities of matter for building purposes. Be it observed that many of those structures of surpassing beauty were the works of what is now considered an unenlightened age ; how justly, let the comparison between modern and ancient buildings prove. Be it observed also, that these were produced, when the surrounding countries abounded with wood ; and mineral substances were used only from a strong conviction of their intrinsic superior good qualities ; in short from true economy.

That incombustible buildings are highly valued by the present generation is sufficiently shewn by the erection of two splendid buildings, at unlimited cost, now in great forwardness, in the city—I allude to the Merchants' Exchange and the Custom House, each on somewhat different principles from the other, as will be shown hereafter, and as might be expected from the hands of different artists ; each work, however, destined to be an honor and ornament to the city for many generations.

Without discussing their ornamental parts, but attending to their useful qualities only, they possess decided intrinsic advantages over all other buildings, in their strength, durability, incombustible property, and in the equalized temperature which their massive masonry will secure throughout ; the last named

object being at once the cause of, and excuse for, the employment of so much more material than is generally used in modern structures.

But it must be evident that such styles of building, however useful or imposing in public works, can never be suitable for, or adopted in private edifices; in which the value of the immense space occupied by ponderous groined arches, and of the massive walls and buttresses required to sustain and to abut those heavy arches, and the value of the immense accumulation of materials, must ever prevent the erection of private works upon entirely the same principles.

Now, as it must be desirable to discover a mode of building, embracing and possessing every good and useful quality which is contained in those public buildings, and if possible in greater perfection, without any unnecessary sacrifice of space or extravagant outlay of money, by quitting a royal for a republican method, and to extend those advantages to the many that are now hardly accessible to the few; and as these objects seem to me easily attainable by the application of some hitherto unpublished facts and principles, deduced from long reflection and experience, I shall in a future paper, endeavor to show how buildings may be economically constructed so as to be insusceptible of speedy decay, or of combustion; more impervious to heat or to cold, to smell or to sound; free from many minor annoyances, and altogether better adapted than those at present in use, to increase the comfort, security and prosperity of mankind.

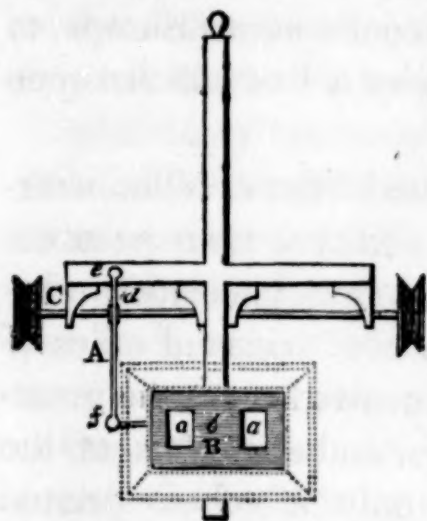
January 1st, 1840.

IMPROVED RUNNING GUAGE, *for ascertaining if the width between the rails of a railway be in guage.*

THE railway guage invented by Mr. COWPER, and now in general use, has an index, acted upon by a hand communicating with a part corresponding in its movements to the sliding shaft, *c*, represented in the drawing; it is therefore necessary for a man to watch its movements, and mark such parts of the

road, by throwing shells or white sand upon the affected parts, as require adjustment.

The drawing represents an improvement suggested by W. I. Hindle, Esq. of Barnsley, which would be entirely self-acting. It is communicated in the *Civil Engineers' and Architects' Journal*, for September 1839, p. 338. This machine would mark the parts of the road out of guage, even if it were attached to a locomotive, traveling at its greatest speed.



By the arrangement of the lever *a*, having its fulcrum at *e*, and the sliding axle *C*, running through the lever at *d*, having collars fitting exactly to the sides of the lever, the axle could turn freely, whilst the least motion in the direction of the axis would be communicated to the lever.

To the end *f*, of the lever, should be attached a moveable slide *B*, having two slits, *a a*, in it, and moving close under the bottom of a box or hopper indicated by the dotted lines; this box should be filled with powdered chalk, or white sand, having an opening in the bottom exactly corresponding with the solid part, *b*, of the slide *B*. When the machine is running upon rails of true guage, the solid part, *b*, of the slide will be under the opening in the bottom of the box, and prevent the escape of the material within; but on coming to a different width of rails, one or other of the openings in the slide will be brought under the opening in the bottom of the box, and allow a greater or less quantity of the material in the box to escape, according as the width of the rails is greater or less than the true guage.

RAILROADS.

F. A CHEVALIER DE GERSTNER, of Cincinnati, published, lately, a comparison between the railroads of the Kingdom of Belgium and those of the United States. This paper, embracing as it does a large mass of tabular and statistical matter re-

lating to the railroads of the two countries, is too voluminous to be published entire in the Repertory, except to the exclusion of much that might claim an equal interest with it; there are, however, some deductions drawn by M. De Gerstner from his data, extremely valuable to all engaged in such works, or in matters intimately connected therewith. The writer of the report was for many years engaged in the construction of railroads in Europe, indeed from the commencement, for he remarks, "in 1824 I had charge of the first railroad on the continent of Europe, to connect the rivers Moldau and Danube, by a line which is one hundred and thirty miles long."

In November 1838, he visited the United States. The interest he feels in our public works and his ability to form a correct estimate of them, again may be gathered from his own words "I have already passed over more than two thousand miles of railroads, and have every where been received with the greatest kindness. The presidents, directors, and engineers, of the different railroad lines gave me not only all their printed reports, but laid before me, with the greatest liberality, their books and accounts, in order to give me every kind of information."

The comparison above referred to was published by M. De Gerstner, with a view to make some return for the kindness and courtesy shown to him by those persons with whom his investigations had brought him in contact, and is based upon those investigations on the one part, and on the other upon the last reports of the Belgian railroads, drawn up by Nothomb, minister of public works, and the engineers of that department. M. De Gerstner's report embraces a period of three and a half years immediately preceding its publication, and as the result of his observations he comes to the following conclusions:

Cost. A mile of railroad with a single track, and the necessary buildings and outfit, costs in America, \$20,000—in Belgium \$41,300, or about twice as much.

Tariff. On the American railroads, a passenger pays, at an average, five cents per mile—on the Belgian railroad, only one cent, or one fifth of the former. In America freight

pays, at an average, seven and a half cents per ton per mile.

Speed. On the American railroads, passengers are conveyed with a speed of from twelve to fifteen miles per hour, stoppages included,—on the Belgian roads, at the rate of seventeen miles ; or, stoppages not included, at the rate of from twenty to twenty-five miles.

Traffic. There are, at an average, 35,000 through passengers, and 15,000 tons of goods carried annually over the American railroads—On the Belgian there have been carried, per year, 478,783 through passengers, and the transportation of goods only commenced a short time since.

Gross Income. The same amounts on the American railroads at an average per mile and per year—

From 35,000 passengers, at five cents, \$1,750

“ 15,000 tons of goods, at $7\frac{1}{2}$ cents, 1,125

“ mail and contingencies, - - - 200—\$3,075 00

On the Belgian roads the gross income per mile from 478,783 passengers, and the transportation of freight, amounts to 32,000 francs, or per year to

6,003 75

Expenses per mile of travel, for each train. These amount on the American roads, to one dollar—on the Belgian roads, to one dollar and five cents ; or they are nearly the same in both countries.

Number of passengers per trip. In Belgium there were, in each train, at an average of three years and a half, one hundred and forty three through passengers—on the American roads, a passenger train contains forty through passengers on an average.

Number of trips per year. In dividing 35,000 by 40, we obtain 875 as the average number of passenger trips per year, on the American railroads ; and in dividing 478,783 by 143, we get 3348, which represents the average number of passenger trains passing annually over the Belgian roads. As, at the same time, the speed on the latter is greater than on the American roads, it was necessary to employ rails of forty-five pounds per yard : while their weight is generally less on the American railroads.

Expenses per passenger per mile. These are, in Belgium, only 0.73 cents, and in America, $2\frac{1}{2}$ cents, or $3\frac{1}{2}$ times more. The reason of it is, that the American trains contain $3\frac{1}{2}$ times fewer passengers, while the expenses per train per mile, are equal in both countries. It is very nearly the same for a locomotive to carry 40 or 143 passengers in a train.

Annual current expenses. In America the annual current expenses for working a railroad are, per mile—

Transportation of 35,000 passengers, at $2\frac{1}{2}$ cents,	\$875 00
“ “ 15,000 tons of goods at $6\frac{1}{2}$ “	975 00
“ “ the mail, and other expenses,	100 00
	<hr/>
	1950 00

Or \$63 41 of every \$100 gross income.

On the Belgian railroads, of every \$100 gross revenue, the expenses are \$65 59, or per year per mile, \$3937 86

Interest on the capital invested. In America the annual average gross income, per mile of road, amounts to \$3,075 00, the annual current expenses to \$1,950 00, leaving \$1,125 00; which compared with the cost of a mile of road, (\$20,000) give $5\frac{1}{2}$ per cent. interest. On the railroads in Belgium the annual gross income per mile is \$6,003 75, the expenses \$3,937 86, leaving \$2,065 89 as interest on the cost of \$41,300 per mile, or exactly five per cent.

MECHANICS' INSTITUTE.

CONVERSATIONAL MEETINGS.

A peculiar and highly valuable feature in the proceedings of the Mechanics' Institute of New-York, is the introduction of conversational meetings, for the purpose of discussing in a familiar manner any subject connected with the arts, mechanism, experimental philosophy, or other matter of practical utility.

These meetings are held regularly on Tuesday, Thursday, and Saturday evenings of each week, and they no further partake of formality than consists in the election of a chairman and secretary at each meeting; the duty of the former being to

decide questions of order, and of the latter to take minutes of the most important points in the discussions, for the purpose of reference by members. Any member may propose a subject, and persons informed thereon are expected to communicate frankly their opinions, and such facts concerning it as they may deem new or interesting. Questions are asked and answered in a free and friendly spirit of inquiry, and thus not unfrequently a large mass of valuable information is gained.

It is not more than about eight weeks since this plan was introduced, and already the meetings are fully attended, and highly beneficial effects have resulted. The spirit of these meetings is not allowed to flag, as it is agreed that the discussions on any one evening shall not be prolonged beyond an hour and a half; viz. from eight to half past nine at each meeting. They combine the advantages of oral instruction and freedom from restraint; for as in a lecture it would not be decorous to interrupt the course of the speaker's matter, in order to obtain explanation, so, in a mere conversation, interruptions frequently turn the current of discourse. But on these occasions each member is heard with respect until he shall have finished his remarks, and thus each contributes to the information of *all*.

It is purposed to give in continuance, the substance of these conversations, and the following is the commencement of the series. Hereafter it may be deemed proper and just to give the names of such gentlemen as may communicate information that shall be novel, ingenious, or important; and it is anticipated that the subject matter will generally be found replete with interest as well as valuable to the community.

Conversational Meeting—Subject, Engraving.

[Reported for the American Repertory.]

Upwards of two hundred specimens of engraving were exhibited by the members, embracing all the known kinds, and many by the first artists. Among the latter we recognized Hogarth, Pirenesi, Wollett, Heath, Albert Durer, Cozzens, Bartolozzi, Sharpe, Burnet, and others. Many of the specimens were antiques of high value, and the varieties of engraving were in line, stipple, etching, mezzotint, aquatint, siderography, cereography, lithography, (including engraving and etching on

stone,) fluorography, (and impressions therefrom, taken direct from the glass plates,) Pentography, &c.

Engraving was perhaps the earliest art on which the ingenuity of man was exercised. It is spoken of by Moses, and not as a new invention even in his day; and all ancient history concurs to place it as one of the most antique of the arts. The hieroglyphic figures of the Egyptians afford the best if not the earliest specimens of engraving or carving. To these may be added those of India, in which the caverns of Ellora, Elephanta, and others exhibit striking specimens; and it is not improbable that there are others of still higher antiquity than those of Egypt. Herodotus describes the shields of the Carians as being ornamented with rude portraitures; the Saxons likewise, in common with other northern tribes, engraved rude devices on their shields. St. Dunstan, Archbishop of Canterbury, that powerful prelate who exercised an influence more than royal in the tenth century, exhibited considerable skill as an engraver on metals; and numerous other proofs could be given of the high antiquity and general practice of this art.

Engraving in fact was pursued as a distinct art, nearly three hundred years before the art of printing was invented, being in considerable use in the early part of the twelfth century.

Engravings on wood.—The first material used to engrave upon was wood. Engravings of this kind were printed from as early as 1423, a subject from the apocalypse, being given for an instance. Some writers give to the Chinese the priority of date in wood engravings. A member saw a Chinese book entirely printed from wood cuts; and Sir William Jones gives an account of *wooden types* being found in a cave in Hindostan. They were supposed to be two thousand years old.

Wood is frequently preferable to copper from its capability of being used in a common press, and from the printing being much cheaper and more convenient. Some wood cuts will give one hundred thousand good impressions, and by stereotyping may be multiplied to any extent. Printers sometimes relieve fine lines by placing thicknesses of paper on the tympan for the darker or stronger parts, and thus materially assist the effect of the engraving, by producing the proper light and shade.

Box and American dog-wood are the kinds in general use, but they sometimes have soft white spots, which are very detrimental. In cutting, the wood sometimes breaks down in the grain, in making narrow lines.

Before a form of types is washed, the wood cuts should be removed, as the *ley*, which is used to cleanse the types, injures the cuts. They should be cleansed separately with spirits of turpentine.

Line Engraving. This is of very early origin; it is spoken of in Exodus. Josephus speaks of two engraved pillars. The shields of the Saxons were engraved. The earliest known date of printing from metallic plates, was about the year 1460. Jackson, on wood engraving, quotes a French author, who speaks of plates by Albert Cunio and sisters in 1200, but the authenticity of the assertion is doubted by him; painting in oil had arrived at great perfection before plates were engraved to print from.

Process. Line engraving was performed by a tool called the graver, but at the present day the subject is generally first etched, and, afterwards, the finer lines and more delicate parts are put in with the graver.

Etching was first practised in or about the close of the 15th century. It is ascribed to Albert Durer, who was the first that excelled in it. Durer was born in 1471—he was a painter, and had studied with *Wohlgemuth*. There are impressions of four of Durer's etchings, dated 1516. The plates are in the British Museum. In etching, the plate of steel or copper is slightly warmed and covered with an *etching ground*, composed of asphaltum and other substances, which is spread evenly over its surface by daubing with a small cushion of leather or silk, and generally slightly smoked over a lamp to give evenness of color, &c. The etching needle, a simple point, is then used to trace the required lines through the ground, so as to expose the copper. A wall of wax, $\frac{1}{2}$ inch high, is placed round the edge of the plate. After being placed in a horizontal position, a dilute solution of some corrosive acid, generally nitric, is poured on the plate, and suffered to remain long enough to corrode the copper where it is laid bare by the needle, the other parts being protected by the etching ground. After pouring off the acid, such parts as are

sufficiently dark are *stopped out*, by protecting the lines with a varnish, similar in composition to the etching ground, and laid on with a brush. The *biting* and *stopping out* processes are then repeated until the etching is done, when the plate is finished with the graver, the larger lines are widened and deepened, and the more delicate ones done afterwards. Skies have been generally done by the ruling machine, but this is now seldom the case.

Good copper plate will give 3,000 good impressions.

“ steel “ “ 10,000 “ “

The plates may be retouched and printed from again.

Printing in colors is sometimes done from line engravings, but more frequently from stippled plates.

Stipple Engraving. This is a variation of *etching*, being executed entirely in dots, marked through the etching ground with the point of the graver or etching needle; after the removal of the ground it is wrought up with the same tools, by pressing the needle into the metal, or picking out with the point of the graver.

Mezzotint Engraving. This invention dates from the middle of the 17th century, and is generally attributed to Prince Rupert. It can be done on either steel or copper plates. The plate is first *rocked*, as it is technically called.

The rocking tool is made of hardened steel, finely toothed on its edge, which is a segment of a circle. With an even pressure the operator rocks it over every part of the plate's surface in every direction, until he raises an even *burr* or roughened surface; in this state an impression from the plate would represent black velvet in appearance.

The artist then uses a scraper, which is a triangular tool, gullied on each side, like the court swords of Louis 16th, so as to present three sharp edges; with this he scrapes off the burr, where he wishes to produce a light impression, using occasionally a burnisher for the high lights. He continues thus scraping more or less, as he requires greater or less light. In other words it is the reverse of an India ink drawing; or, it is like imitating an India ink picture by using white paint on a black ground. The impressions from such a plate appear like a highly finished India ink picture.

Mezzotint engraving on copper will not allow near so many impressions as those from *line* engravings, or from stippled plates; and great objections were made to it on this account, until our talented countryman, Mr. Joseph Perkins, first reduced the process to practical utility, by the introduction of decarbonized steel plates. This was done by him about the year 1814, since which, mezzotint engraving has been greatly in demand, and many beautiful specimens have been given.

Aqua Tinta. This is performed on either steel or copper, but more usually upon the latter. Finely pulverized resin is evenly sifted over the surface of the plates; it is then slightly warmed, so that the particles may attach themselves to the plate, but not sufficiently to cause them to run together; an acid is then poured over the surface as in etching, and an even ground is thus bitten between the particles of resin. The parts required to be light are *stopped out*, and the biting is repeated, when the second class of lights are *stopped out*; and so on in succession until the plate be finished.

The ground is sometimes laid by using a solution of gum which granulates as the dissolving medium evaporates. If a second ground be necessary, the gum will granulate on precisely the same parts as the first.

The mode of printing from metallic plates, is by covering the surface of the plate, which is slightly warmed, with ink, and wiping it off with the hand; this leaves the ink in the incisions but removes it from the surface. A sheet of paper is then placed on the surface of the plate, and both are passed under a roller, with a heavy pressure, whereby the paper is forced into the incisions so as to remove the ink. Wood cuts are printed from, in a manner similar to that of type, by inking the surface with a roller or a ball, and giving a pressure which is but slight as compared with that which is necessary for the copperplate.

Cereography—from *Cera*, wax. This art has lately been brought to a great state of perfection by Mr. Morse, of this city. His process has not yet been made public.

Similar results, however, have been obtained in Europe, and it is much used instead of wood engraving. A company has been established in Edinburgh for prosecuting this art; they

have obtained a patent for it, which promises to be of the utmost importance in facilitating and cheapening the productions.*

One of the members showed a specimen, called *metallic relief*, evidently produced by similar means; at any rate with similar results.

Lizars, a few years since, covered a plate of copper with a coating of plaster, and after scratching his design through to the copper, he took a cast in type metal therefrom, but found great difficulty in inking the surface and printing cleanly from it, for want of depth. This and similar plans, by the use of wax and other materials instead of plaster, have often been proposed, but until lately, without success. A member suggested the following: cover a highly polished glass plate with a mixture of wax and other ingredients, and trace through it the design; then apply sulphur, which has been worked soft in water after being melted.† With a slight pressure, the sulphur could be forced into the incisions, so as to give, without abrading the wax, a sharp cast, from which a stereotype could be taken, and the fine surface of the glass would insure a good face to the type.

Siderography—(From the Greek *σιδερω*,—*sideros*, steel.) This art was invented by Jacob Perkins. The method in common use is to engrave the subject on a steel plate, which, when hardened, is transferred by means of pressure upon a softened steel roller with the subject reversed and raised—after hardening the roller, softened steel plates can be impressed, hardened and printed from, ad infinitum, wear of roller only excepted.—Almost all the vignettes of bank bills are thus engraved. It is

* The following remark is from a British Journal: Several specimens of engravings executed under the new process, having been shown us, we can confidently add our testimony to the value of the invention. It is a decided improvement upon wood engraving, and possesses almost, if not altogether, the delicacy of that of copper. The process is an exceedingly simple one. A thin paste is spread over the surface of a sheet of copper or steel; the lines of the picture to be copied are drawn upon the paste, and a stereotype plate immediately taken therefrom. We understand that good judges are quite sanguine of the success of the invention.

† When melted sulphur is thrown into water and worked rapidly by repeated squeezings with the hands, it will be quite soft so as to take very sharp impressions; in a short time after, it becomes exceedingly hard.

now used in the United States mint for duplication of dies for coining.

☞ Lithography and engraving on stone will be fully treated of in a future number.

Subject, Stoves.

A member gave the following history of the use of stoves in this country. The first stove used was the Dutch cockle, or common box stove, of cast iron; for more ornamental purposes the Parisian or French stove was used, which was formed of a large mass of bricks covered with white china-surfaced tiles, handsomely ornamented, and had a small fire place. The friends of this stove argued that the heat given off, by the fire to the bricks, was retained by them for a long time; and was given off slowly, after the fire was expended and the flue shut. These stoves were used for burning wood. To these may be added the *Franklin*, so well known to all Americans of the last century, and invented by one of her most gifted sons. The ordinary ten-plate stove was the next known, which passed into very general use, and was the first to embrace any of the well known scientific principles, connected with the radiation of heat and consumption of fuel. The flue passed up the rear of the stove and returned at the top, between two plates, to the front, where it passed into the pipe, thereby giving a large surface for receiving and radiating the heat.

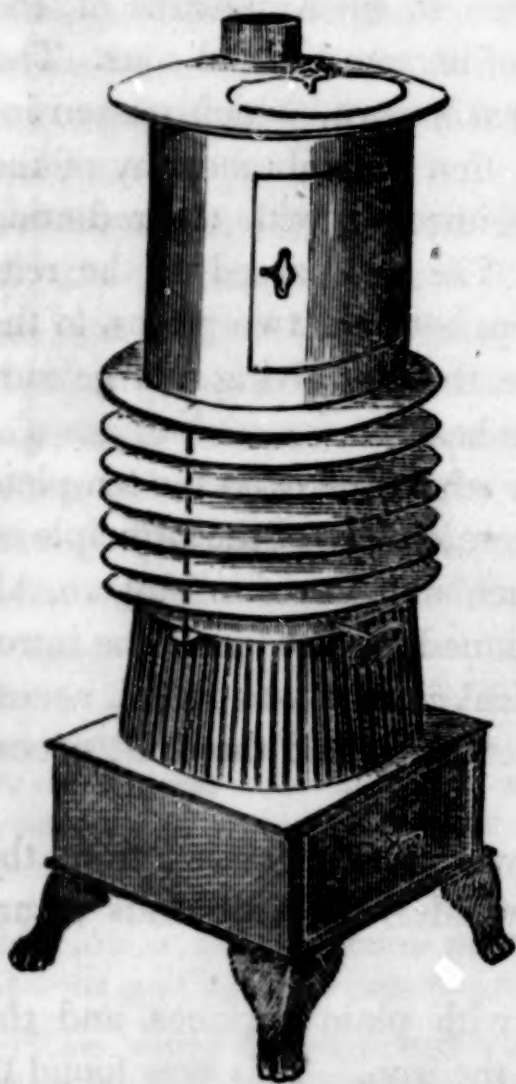
The soap stone stove, and many others followed the ten-plate for the warming of parlors, and were chiefly of the principle of that already described as the French and Parisian stove. All these plans, and many others continued in use until the introduction of anthracite, when a radical change was found necessary; as none of those already mentioned had the draft necessary for its combustion.

The shapes now resorted to were innumerable; from the horizontal to the perpendicular cylinder, with all kinds of arrangements for the grate, &c.

For a long time they were cast with plain surfaces, and the coal burned in direct contact with the iron. This was found to alter the shape of the stove, and soon to destroy it. To obvi-

ate this difficulty they were lined with fire brick, or other bad conductors, by which means a much larger number of the *improvers*, as they styled themselves, passed a majority of the heat, which should have been radiated into the apartment, through the stove pipe into the chimney; and this error, with very few exceptions, still exists. Some inventors, among whom may be named Dr. Nott, ornamented the outside of their stoves with gothic and other ornamental fret-work, thereby much increasing the surface for direct radiation. Each attributed some particular virtue to the construction, as to form, &c.: but in reality the stove presenting the greatest quantity of surface gave the greatest quantity of heat.

It remained for one of the members of this Institute (Mr. JORDAN L. MOTT) to observe this fact, which had been passed over by the inventors themselves, and he determined not only to take advantage of his observation by increasing the surface



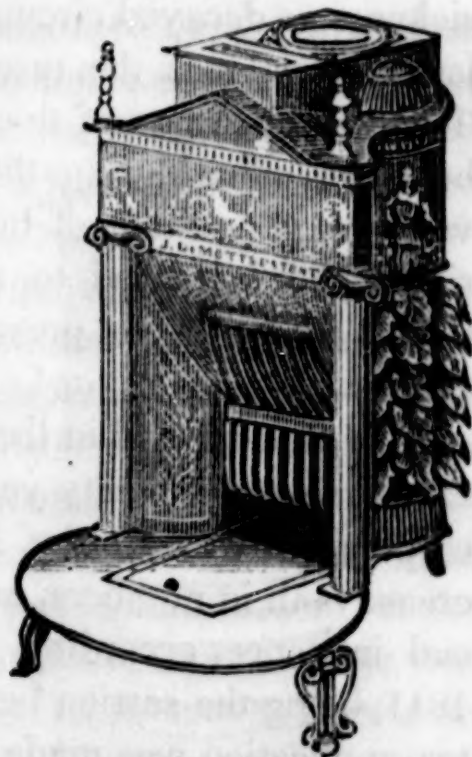
of his stove, but so to increase its radiating as to do away with the necessity of lining the stove at all; believing rapid radiation alone, sufficient to protect the iron from becoming overheated. With this view he constructed a stove, the radiating surface of which was increased 11 times more than a plain cylinder of its size. His first experiment was to construct stoves formed of rings, cast separately, which when placed one above the other composed a cylindric stove, which will be better understood by reference to the cut. The rings to this stove were cast solid, and projecting; consequently, as the inner part of the rings became more heated than the outside,

they necessarily cracked, and the plan seemed for the moment impracticable.



Mr. Mott next formed the rings with the outer edges so shaped as to do away entirely with this objection, and at the same time permit any degree of surface for radiation he might desire to be exposed. With rings thus constructed he has formed stoves of all desired shapes, from the common office or factory stove, to the more elegant parlor stoves and Franklins; all of which are found perfectly practicable and free from the ordinary accidents.

The quantity of heat radiated is so great, that the stove pipe is much cooler than in ordinary stoves, and consequently a larger quantity becomes available for use.



It was suggested by a member that a surface of points, either angular or teat-shaped, would add to the economy of this stove; as the points, if rightly formed, would cause the heat to pass to the atmosphere in many more directions, without obstruction.

A visitor present gave an account in detail of an urn stove of copper, which he had seen in Paris a few months before. It had no pipe. He stated that Gay Lussac had given as his opinion, that a stove so constructed would heat a room one hundred feet square for twelve hours, and accounted for the phe-

nomena, by stating that, where a pipe is used, ninety five per cent. of the heat passed to the chimney, and but five per cent. is radiated into the apartment, whereas with the urn stove all the heat is usable. He proposes no plan however for getting rid of the gases formed.—ED'S NOTES.

TRANSACTIONS

Of the General Society of Mechanics and Tradesmen of New-York.

THIS very excellent Institution had its origin in the most benevolent of purposes, and has had existence upwards of fifty-four years. It commenced as a private association of individuals, whose objects were to provide assistance to members in sickness or decayed circumstances, and for such other benevolent purposes as the means of the association would permit. The first chairman of this association was Robert Boyd, who held the office during the years 1785 and 1786; and under whose care and that of his equally zealous successors, it flourished and increased to such a degree, that at length it was found advisable to preserve its perpetuation under a state charter.

This was effected in the year 1792, the charter being granted for the term of twenty years, and the first President of the incorporation was Robert Boyd. The society continued to increase both in numbers, and in the power to extend its beneficial influence, according to the design of its foundation. In 1811, being the session before the legal expiration of the charter, application was made with success for a renewal, with privileges extended, proportionate to the enlarged means of utility; the second charter having force until 1833, and restricting the society in the expenditure of its funds to the support of indigent members, or of the widows and children of members, and to the necessary repairs of buildings belonging to the society, together with the incidental charges relative to the general management.

But the society so rapidly increased, as necessarily so benevolent a society would, that, in 1820-21 it was in condition still further to extend its benefits to members and their families;

accordingly an act was obtained to amend the act of 1811, which enabled them to appropriate a portion of their funds to "the establishment and maintenance of a school for the education of the children of indigent or of deceased members of the society, and also to the establishment of an Apprentices' Library, for the use of the Apprentices of Mechanics in the city of New-York."

This very satisfactory progress of the society continued without intermission; and in the year 1833 its charter was renewed until the year 1860. On this occasion further privileges were obtained; for the present act declares, that "the said society shall have power to use their funds for the support of indigent members of the said corporation, and the widows and children of any person having been a member thereof; for the establishment, support and maintenance of a school for the *gratuitous* education of the children of deceased or indigent members; and for the establishment, support and maintenance of a library and *reading rooms*, for the use of the apprentices of mechanics and others, of the city of New-York."

Of the value of the *pecuniary* benefits conferred by this admirable society, some estimate may be made in the mind; but who can calculate the obligations conferred upon the young, in the gift of a sound and moral education, the use of literary works on valuable and interesting subjects, and an invitation to spend their leisure hours in the quiet and rational gratification which commodious reading rooms will afford, instead of the tumultuous and irregular amusements of the town? How vast is the advantage to young persons that their conduct, as seen through such an establishment as this, is silently but vigilantly examined; how much of their future welfare may be traced to the advantages they receive here, and to their deportment whilst they are enjoying those advantages!

But the society has not stopped even here; for as the school and library privileges include the introduction of lectures on scientific and other useful subjects, there has for some time been a regular succession of lectures given by persons eminent in their several departments, which have been highly edifying and instructive, well attended, and doubtless productive of important benefits.

The President of this Society is, *ex-officio*, a director of the Mechanics' Bank of this city. This has tended not a little to the maintenance of its high respectability; and indeed it may justly be said that all the members are endued with a high sense of its importance and are zealous in its support.

The library, which consists of many thousand valuable works, is in excellent order under its careful librarian, Mr. Swan. It is contained in the extensive basement rooms of the society's schools in Crosby street. The schools are airy, commodious, and numerous attended, and the course of education adopted is extremely judicious.

PROCEEDINGS

Of the Mechanics' Institute of the City of New-York.

Wheresoever institutions of this description have been formed, they have invariably resulted in important benefits to the community. It is certain that they have contributed more largely to elevate the mechanic into a man of science and reflection, than could any other lever that could be called into action; and in doing this they have likewise communicated the impulse, which has ripened into a principle of duty, to reciprocate knowledge, and exchange the benefits of practical skill.

The Mechanics' Institute of New-York, is one of those excellent associations for this generous purpose; and during the few years it has been in operation, it has contributed its full share of general good, and given powerful impetus to scientific, and mechanical knowledge. The Institute had its origin in a series of lectures given by Professor John Steele, on chemistry and natural philosophy, in the winter of 1830-1. When it was first formed it consisted of only forty-five members, but so rapidly did the members increase that they were enabled to apply for and obtain a charter of incorporation, in the month of April, 1833. The members have steadily continued increasing, and at this time they amount to nearly fourteen hundred.

The principal objects of the Mechanics' Institute, are the following, viz.

1. The cultivation among themselves of all the useful arts and sciences.

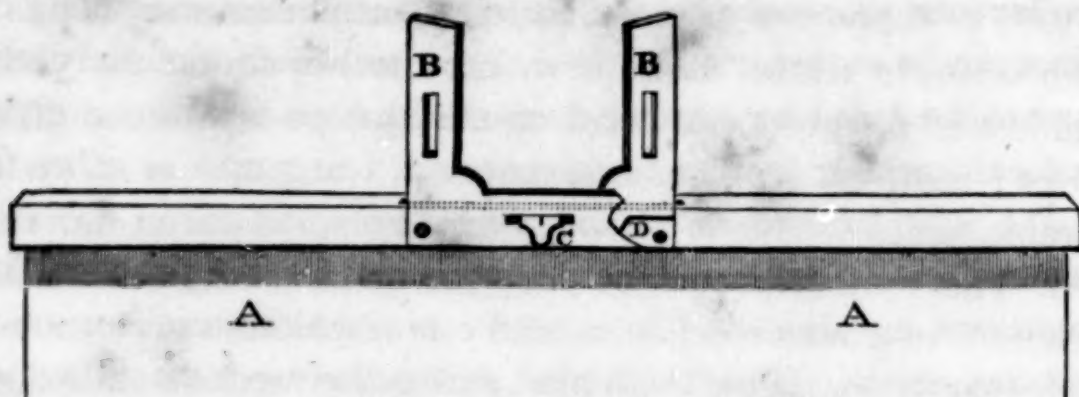
2. The support of schools, for the education of the young of both sexes, in all the useful branches ; to which, not only the children of members, but of others shall have access upon given terms ; those of the members, however, being upon a more favorable scale.

3. The establishments of departments for the practical instruction of young mechanics, and others, in the sciences more immediately connected with the particular business in which each is engaged.

4. Encouragement to skill in the mechanic arts, by the exhibition of specimens at annual fairs, and the gift of premiums, certificates, &c. to those who have distinguished themselves on such occasions.

In the promotion of this excellent design they have established a valuable library, to which considerable additions are annually made ; they have a convenient reading room, a spacious lecture room, a museum of ingenious models of machinery, an extensive chemical and philosophical apparatus, a large and choice collection of minerals, and, in short, have possessed themselves of all the facilities for the dissemination of knowledge. Lectures on various subjects of utility are given every Monday evening, during the winter, to which the families of the members are at liberty to be present ; and these last, which are commonly well attended, have probably assisted essentially in forwarding the ends of the Institute.

In an association, the members of which have so warmly its interests at heart, there can be no doubt of its prosperity in itself, and of its valuable effects on the community. Already have many others in this state been founded, based on the same principles as those of the Mechanics' Institute of New-York ; and with such noble objects in view as those which they contemplate, we believe that there will be no one who can hesitate to bid them ' God speed.'



Report of the Committee of Arts and Sciences of the Mechanics' Institute, on MR. PEARSALL'S ROW-LOCK for Boats.

DESCRIPTION. A, gunwale of the boat; B B, two pieces of metal of the shape described in the drawing, composing the row-lock, which may be shut at pleasure so as to leave the gunwale without protuberances, and the row-lock secure from accidental breaking; C, a button or pin to fasten the row-lock upon, when required to be used. D a raised shoulder, so constructed as to receive the pressure from the point of the L of the row-lock opposite, which has a corresponding shoulder; so that, in either movement of the oar, neither piece of the row-lock can be easily strained or broken.*

The committee are of opinion that the above is a material improvement on former plans:

1. From its shutting up, so as to present a plain gunwale when not in use, and a sufficient row-lock when required.
2. From its economy, and from the high testimonials presented by the inventor.

Respectfully submitted,

JAMES THOMAS, *Chairman.*

Mechanics' Institute, New-York, November 4th, 1839.

Pearsall's row-locks are particularly recommended—

For sail boats, as being entirely out of the way and yet always in their place to be used at a moment's warning.

For passenger boats, as they are rigged for four pairs of

* It not unfrequently happens that boats on the decks of vessels lose their thole-pins, from their liability to be pulled out by ropes sliding along the gunwale, and thereby the lives of persons, accidentally thrown overboard, are often unexpectedly jeopardized, from the boats being found unmanageable.

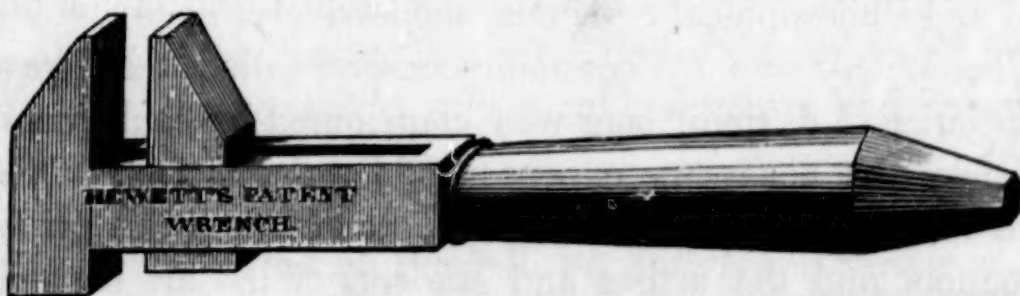
sculls; one pair only being in use at once, the other six rowlocks can be closed out of the way, removing all liability of being broken; and by leaving a smooth surface on the top of the gunwale, adding beauty to the boat.

For pilot boat yawls, as they have occasion to unship their thole-pins when taking the yawl on board of the large boat, and when coming alongside in a heavy sea, which is very difficult and dangerous. The thole-pins, being wet and swelled tight, cannot be removed, and are left; consequently they are frequently broken by striking against the side of the vessel; whereas, the above rowlocks only require the slide to be drawn, which can be done in an instant, and they drop down out of the way.

For all kinds of boats, as being made of metal, they will last as long as the boat in which they are used.

For all boats rigged for sculls, as, when rowing long oars, the the opposite row-lock can be closed, out of the way of the arm, elbow, &c. of the person rowing; which is very desirable, as every one can testify who is in the habit of rowing in a narrow boat.

For sale at the Oar Establishment, 402 Water street, by the inventor.
JOHN A. PEARSALL.



Report of the Committee of Arts and Sciences of the Mechanics' Institute, on a SCREW WRENCH, invented by HENRY W. HEWET, of Troy.

The engraving will fully illustrate this very useful improvement. It may not be amiss, however, to name its advantages over the common, and other wrenches now in use.

The advantages of the parallel bars as substitutes for the single bar, to hold the jaws of the wrench, are, greater strength and precision of motion to the sliding jaw.

The adjusting nut, being placed at the end of the handle, is always at command, and is a much better arrangement than the sliding spring catch, or the ordinary adjusting screw; as, with the latter, it often happens that there is not room to enter the hand for their adjustment.

With the ordinary adjusting nut, the size of the entire handle, they soon become loose, and in a greater or less degree unfit for use.

JAMES THOMAS, *Chairman.*

Mechanics' Institute, Dec. 15, 1839.

[For the American Repertory.]

NATIONAL ACADEMY OF DESIGN.

In the fall of 1825 several of the artists of this city, feeling the want of harmonious intercourse and improvement in their profession, associated themselves together, for the purpose of drawing from the antique and other models, during the winter evenings, and, as originally proposed, at the house of one of the projectors of the plan. The number who immediately signified their wishes to become participators in the advantages of the scheme proved this arrangement to be too limited, and an effort was made to procure more ample apartments, which they obtained by the generous loan to them of the rooms of the Historical and Philosophical Societies, successively.

The Society was by common consent called the Drawing Association. A small sum was contributed by each member, to defray the necessary expenses of light and fuel. Officers were chosen to manage the business attendant on this primitive formation, and the artists and students of the art became an organized body; but, at that time, with no other intention than that of mutual intercourse and improvement in the art of drawing.

Circumstances of a controversial character, with the American Academy, entirely unnecessary here to be introduced, soon changed the aspect of affairs, and caused the associated artists to project the plan of forming an academy for the encouragement of the fine arts, in conformity with their own views of what such an institution should be. The plan was matured,

and the National Academy of Design was the result. The drawing association consisted of some thirty or forty members, some of them professional artists, some amateurs, and some students of the art; all enjoying equal privileges in the association, and all interested in the creation of the new society. It was obvious that materials so diversified could not enter into the formation of the new Academy, now about to assume a definite character and object, in the same heterogeneous mass as in the primitive association. How the one should resolve itself into the other; who should be constituted members of the new society; how they should be classed, or how selected, was the difficulty to be overcome, and was ultimately accomplished as follows: The members of the drawing association, at a meeting called for that purpose, elected by ballot fifteen professional artists from among their own numbers; the fifteen artists so selected, were, by the tenor of their election, empowered to assemble forthwith, and to choose by ballot not less than ten, nor more than fifteen more professional artists, either from within or without the association:—the whole number consisting of the fifteen selected by the original body, and those selected by the fifteen, to constitute the new society. Thus was formed the National Academy of Design.

Its great ruling principle was, and is, that its government should be entrusted entirely to artists.

Its objects were, instruction, exhibition of the works of living artists, and the promotion of mutual intercourse and harmony in the profession.

The work had now fairly commenced. The following extract from the letters of Boydell, an anonymous writer of the period, will give a vivid idea of the early struggles of the infant institution: "Immediately after the organization of the new Institution, measures were taken to open its first exhibition; and, notwithstanding the many difficulties under which they labored, at this commencement of their undertaking, such as the want of convenient and properly lighted rooms, &c., the artists succeeded in collecting together such a display of talent as surprised every visitor of their newly formed gallery; consisting of works of living artists only, which had never before been ex-

hibited, and which, by the rules of the Institution, can never be included in any future exhibition—a plan which ensures novelty at least. The expenses of this, their first year of existence as an Academy, were somewhat greater than the proceeds of their exhibition, and the deficit was provided for by a small assessment upon the members, which was promptly and cheerfully paid. Not discouraged by this result, they immediately determined on another effort in the ensuing year; and, to defray the expenses of the school, they concluded to receive from students a small sum, sufficient to meet the expenses of lights and fuel. In their second annual exhibition—in which was found a more splendid display of living talent than had ever before been presented in this city—they were more successful—their receipts not only defrayed expenses, but left them something in the treasury. Now, however, their greatest difficulty arose; the room in which the students assembled, to prosecute their studies, had been, till this time, loaned to them, but the society which had so generously befriended the Academy could spare the room no longer. No alternative, therefore, was left them but to hire a room, or break up their school. An application for assistance to the Common Council was not listened to; they therefore resolved to incur the risk of hiring, for the year, the room in which they had made their exhibition, over the Arcade Baths in Chambers Street.”

In this room the Institution continued until the increase of students, and the number of works of art offered for exhibition, rendered it no longer sufficient for their purposes, and they ventured upon leasing, at a greatly advanced rent, the rooms of the upper story of Clinton Hall, where it was believed ample accommodations would be obtained for all their purposes. This removal of the Academy from Chambers Street, to the Clinton Hall, with its attendant expenses, was a step hazardous almost to the existence of the infant institution; and a combination of unforeseen circumstances rendered the measure one of serious embarrassment. On the approach of the usual time for preparing for the annual exhibition, it was found that many exhibiting members were absent from the city, and, as a consequence, were not likely to send works for exhibition. This de-

prived the institution of the ability to present its usual display of talent. In this dilemma it was proposed that the exhibition should, contrary to rule, consist of works previously exhibited, and (by selection of the artists,) be a review of the most prominent works of the previous exhibitions—no new pictures.—By this means the Academy prepared an exhibition far surpassing any that had been produced under the limited rule of excluding all pictures that had been previously exhibited. Its success was complete—one objection only was made on the part of the society. The unfavorable contrast the exhibition of the yearly product would undergo, in comparison with its more fortunately selected rival. It was, however, resolved, that every sixth exhibition should be a selection from, and a review of, the works exhibited in the preceding five, though the cause that produced the first had happily ceased. For some time the institution continued its progress, varying but little in its duties or its results, gradually increasing its usefulness, and, of course, its expenses. The increased attention given by the public to its exhibitions enabling it always to meet the latter.

After surmounting so many difficulties, it was discovered that it had to contend with a new enemy—and if report speaks truly of the “business” qualifications of the profession—one they were least likely to encounter with any degree of success. The institution was found suddenly to have incurred—if *incurred* it may be called—a considerable debt, and that in a manner the most unusual and unlikely to produce such a result, to wit: by the generous donations of its friends. This singular anomaly may be thus explained. The presents received were “casts” from the antique statues, and other useful material, selected by its friends in Europe, and consigned to the care and use of the Academy in New-York. The result, ultimately highly advantageous to the institution, was otherwise at that time. The freight bills alone were more than the treasury had ability to pay, and, of course, plunged the Academy into debt; to meet which they had only the revenue of the ensuing annual exhibitions. The receipts of any one of which (at that time) in gross, would not have paid the amount. It was obvious the whole receipts could not be so appropriated. The exhibitions must be

continued—the expenses of creating the same must be paid, to enable the society so to continue them. By continuing them only could they hope to obtain the means, ultimately, of paying the demand. Under this their treasurer submitted to the council a statement of the revenue of previous exhibitions, an estimate of the probable receipts and expenses of future exhibitions, accompanied with a plan for the gradual liquidation of the debt, under the then existing capabilities of the institution. This gave a ray of hope—though the question was naturally asked, Would the creditors consent to wait for payment? Be that as it may, it was the only mode proposed, and the only means in their power to offer, consequently, was unanimously adopted by the council, and the treasurer appointed a committee, forthwith, to make the statement to the creditors, and to endeavor to obtain their consent to the measure. The statement was made, and consent obtained. Two years within the period asked, the institution had the satisfaction to find itself out of debt, and its creditors paid, in full, with interest.

Having overcome this difficulty, the Academy has, from that period to the present, proved prosperous, and gradually accumulated a property which has enabled them to extend their accommodations to the students—to establish the “Life School” in addition to the “Antique,” to award premiums, and otherwise to place the students’ department of the institution on the footing of the most approved European schools of a similar character. They have also by the same means, been enabled to enlarge the accommodations for their annual display of the works of living artists, consonant with the increase of exhibitors.

The demands on the institution prove that they are still in want of accommodation, in many important particulars, to meet the requirements of an increasing body of artists, and to carry out the intentions of the institution. They have, therefore, determined on another removal, to the still more ample and better lighted rooms, in the new building erected by the New-York City Library Society and Athenæum, where we understand it is their intention to fit up their gallery in the best possible manner. The want of direct light, so much complained of in

the present exhibition room, being entirely obviated in their new apartments, by the proper construction of the lights.

We cordially wish them success. They are the pioneers of independence in the arts of design in our country; and every artist who cherishes the true spirit of independence in his profession in harmony with the republican spirit of the institutions of his country, should be with them. C.

We heartily concur in the writer's wishes for the success of the artists. They have produced an institution in a spirit of liberality worthy of the city. They have no salaried offices to fill with members; all the receipts are devoted to the general benefit of the society; and that no error may be promulgated to their injury, as to the uses or manner in which they apply their rapidly increasing funds, we have asked, and been favored with a copy of the last year's treasury report, from which we publish such a summary as will give our readers a general idea of their receipts and expenditures for the year, and the amount accruing over and above the same, to the permanently invested funds of the Academy, which, with the permission of the society we will furnish annually.

Total receipts of the year from all sources, -	\$ 5170 86
Expenses of institution, including exhibition, schools, &c. - - - -	2470 86
Works of art purchased in Europe for the library, by order of the council, - -	700 00
Amount carried to the invested fund of the institution, - - - -	2000 00
	<hr/>
	\$5170 86

[For the American Repertory]

LYCEUM OF NATURAL HISTORY

IN THE CITY OF NEW-YORK.

In 1817 a few individuals desirous to improve themselves in Natural History, and to diffuse a taste for that branch of knowledge, formed themselves into a Society called the Lyceum of Natural History. It met weekly at the house of some one of

the members, and at the meetings, subjects were discussed which related to the objects of the association. At this time little progress had been made in this city in Natural Science, and the number of members amounted only to twenty-two.

The Literary and Philosophical Society and the Historical Society both of this city had been already founded, but neither of them paid particular attention to Natural History.

In 1818, the Society was incorporated under the above title. The common council of the city soon after granted them the gratuitous use of several apartments in the building in the rear of the City Hall, which had once been used as an Alms House, but which was then repaired and appropriated for other purposes, under the denomination of the New-York Institute.

Here the Lyceum remained ten years, during which it gradually advanced in numbers and usefulness. A library and a museum were formed, and were enriched by donations from foreign societies and naturalists, and especially by those of its own members. In 1824 it received a sum of between two and three thousand dollars, from the Military and Philosophical Society of the United States, composed of officers in the army; they had ceased to meet since 1809, their object having been better accomplished by the establishment of the Military Academy at West Point, and their funds, now transferred to the Lyceum, had been for some time accumulating.

About this time the Lyceum commenced the publication of its "Annals." This work is confined to original articles on natural history, read before the members, and from its nature it cannot be expected to have a general circulation. It is not published at stated periods, but according to the materials possessed by the Lyceum, and its ability to bear the expense. In 1828, the apartments granted by the city were required for public purposes, and the Lyceum was removed to the City Dispensary, in White street, where it continued about eight years. During the latter part of this period, an arrangement was made with the New-York University, by means of which, the students of the latter had the benefit of the library and museum. The location was nevertheless inconvenient, and the accommodations insufficient; and an attempt was made to

raise funds for the erection of a building which might be creditable to the city, and appropriate to the purposes of the institution. In 1829, a subscription for this purpose was set on foot, but the importance of the society was not yet duly estimated by the public, and the amount subscribed was inadequate. A few years afterwards the attempt was renewed, and through the zeal of the then Treasurer, Dr. Jay, and the liberality of our citizens, and especially of the merchants, was crowned with success. A spacious edifice was erected on Broadway, between Prince and Spring streets, of which the Lyceum took possession in 1836. It is of brick, with a basement of granite, fifty feet wide, ninety-two deep, and sixty-five high. It contains, besides a large lecture room, library, room for meetings, and other apartments, a museum forty-seven feet wide, by eighty long, and thirty-five feet high, lighted from the top and at one end, and surrounded by a gallery. The specimens are arranged in cases, in systematic order, with the *name* and *locality* of each affixed, together with the name of the *donor*. The collection is still incomplete, but considering the means of the society and the time elapsed since its commencement, its extent is matter of surprise, and highly creditable to the members. It is divided into four departments—zoology, botany, geology, and mineralogy. The mineralogical cabinet will bear comparison with any in America, and is arranged according to Cleaveland's classification. The donors to whom it is principally indebted are, Dr. Mitchill, who bequeathed to it his entire collection; Mr. J. Dixon, of England; Mr. S. N. Caström, of Sweden; Mr. Wheaton, American Minister at Copenhagen; Dr. J. Torrey; Major J. Delafield; and the Mineralogical Society of St. Petersburg.

The cabinet of shells has lately been much enriched by a valuable donation from Dr. Brinckerhoff, of the United States Navy, who has liberally presented to the Lyceum a large collection in every branch of natural history, made by himself during a single voyage; the shells alone amount to near two hundred species.

The botanical collection contains dried plants, and preserved fruit, and is divided into two sections, American and Foreign.

The latter contains several thousand specimens, including about one thousand collected in Java, by Mr. Blume; a number from China, presented by Mr. Williams, missionary printer at Canton. The American portion was principally collected by Mr. William Cooper, and Dr. Torrey, and has recently been arranged by Dr. A. Gray, and Mr. R. H. Brownne.

The collections of quadrupeds, birds, insects, and fossil animal remains are respectable, and include many curious and interesting objects, but not so complete as the other departments. The library and museum are open to all our citizens gratuitously, under some necessary regulations. The members are divided into honorary, corresponding, and resident. The honorary embrace the most distinguished naturalists at home and abroad; their number is limited.

The corresponding members are numerous, and include those who make natural history a particular study.

The resident, are those who reside in this city, or its vicinity; their number is about two hundred.

The Lyceum, like most of our other institutions, which rely for support on individual efforts and liberality, is straitened for funds; but considering the means it has possessed, the progress made has been vastly greater than could have been reasonably expected, and is highly honorable to its members.

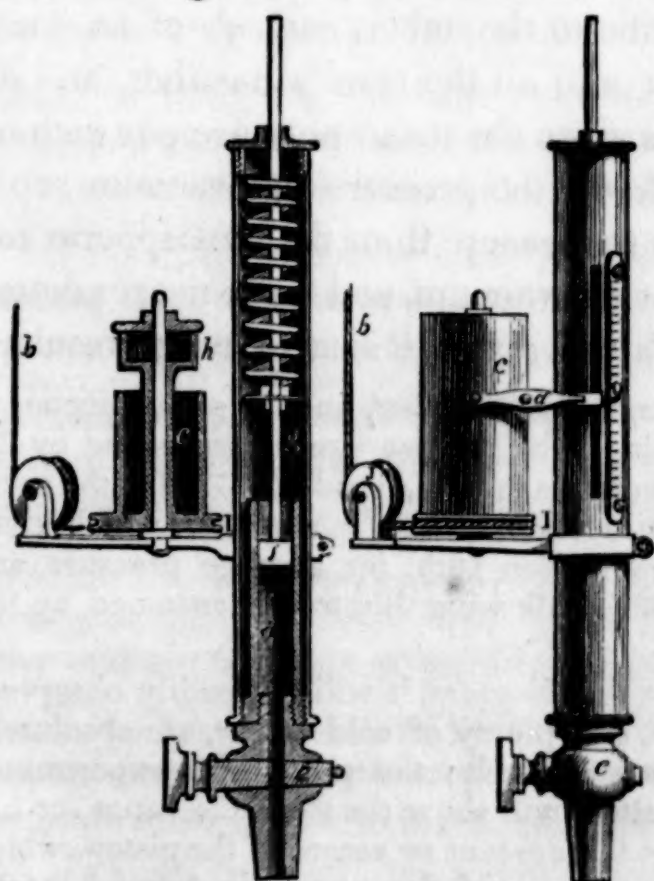
N. B. The Lyceum meet on every Monday evening at seven o'clock, and, upon the introduction of a member, all persons interested may attend. Donations, of books and of specimens for the museum, are respectfully solicited. B.

Lyceum, January 20th, 1840.

STEAM ENGINE INDICATOR.

We are very happy in being able to present our readers with a description of the improved steam guage now in use on board the British Queen; and also a synopsis of particulars of her late voyage from England, most of the items of which were obtained by means of this instrument. It not only enables the engineer at all times to know the working condition of his engine, but at the same time supplies a written register, which may afterwards be referred to.

It exhibits the density of the steam in the cylinder and the quality of the vacuum at every part of the stroke. It is simple in its construction and easily understood and applied. By it, a steam engine proprietor can ascertain in one minute the working condition of his engine; he can detect neglect in his engineer; can demonstrate the quantity of power required to overcome the friction of the engine, to give motion to the shafts and mill gearing, or to drive the machinery. He can tell the power expended to drive any part of his works; or, if power is let off, he can at any time prove what power his tenant consumes; he can ascertain the friction of the machinery, when using different oils; and can guide himself with certainty in the choice of that which is best. He can ascertain the expenditure of steam, when injecting water at different degrees of temperature; and can compare the saving arising from the use of cold water, with the expense of procuring it. In fact by this instrument, he not only can find out the most economical way of working his engine, but he can measure the expenditure, and regulate the distribution of his power at all times.



The cylinder of the indicator *a* is equal to $\frac{1}{4}$ of a square inch, the divisions on the scale $\frac{1}{16}$ of an inch, each division representing one pound of pressure on the square inch of the piston.—When the cock *e* is shut the index will stand at *o* or zero; when opened, the pressure of steam will be exhibited above *o* or zero, and the vacuum below.

The cock *e* should be placed in the grease cock top of the cylinder of the engine, or a separate opening may be made for it; on opening the cock *e*, the small cylinder *a* becomes

part of the engine cylinder, and the small piston f is acted upon in the same ratio as the piston of the engine; to the piston rod g is attached the index hand d , in the end of which is affixed a pencil, which is acted upon by the piston f , when raising or falling from the effect of either pressure or vacuum. The small cylinder c is covered with a sheet of paper, and at its upper extremity is an ordinary watch spring h ; the horizontal pulley I has a cord b , passing from its edge around the perpendicular pulley J .

By attaching the cord b to the radius bar of the engine, at such a part that its movement will be equal to the circumference of c , it will readily be perceived, that from the movement of the piston f and the cylinder c , the paper will receive a mark similar to the dotted line described in the annexed cut, (which is an exact representation of one taken on board the British Queen reduced to one fourth the original size,) the straight line



o is called the atmosphere line, or line of zero, on the scale. To ascertain the average pressure from steam and vacuum, first divide the atmospheric line into ten equal parts, as represented in the cut; measure these lines from one dotted line to the other, each $\frac{1}{10}$ of an inch, being one pound; add all the results together, and divide by ten—this gives the mean pressure per inch on the piston. If desired to know the pressure and vacuum separately, it is only necessary to measure from the atmospheric line to the farther dotted line for the vacuum, and to the nearer dotted line for the pressure, which will give the same average result.

“To find the power the engine is exerting, find the square inches in the area of the cylinder, multiply by the average pressure, and by the number of feet the piston travels in a minute, divide by 33,000, the number of pounds a horse can raise one foot high in a minute, which gives the horse power. Engineers reckon 10lb. for average pressure, and only 7 for effective power, that is allowing 3lb. to be consumed by the engine itself.

“From what is shown by the diagram, it will be readily observed, that ports of a sufficient size, and plenty of cold water, are absolutely necessary to make an engine work well; the tables, from experiments made by Dr. Ure and Mr. Dalton, will show the force the vapor, or uncondensed steam, has to resist the descent or ascent of the piston, which will be according to the temperature of the water discharged by the air pump.

“The column marked *Libs* is made by adding the results of Dr

Ure's and Mr. Dalton's experiments together, and taking the average, and stating a column of mercury of 30 inches high at 15 lbs.

"An Engine with a 24 inch Cylinder and a 5 feet stroke, making 22 strokes or 22 revolutions of the crank shaft per minute, with an average pressure of 10lb. upon the square inch of the area of the piston, is usually given for a 20 horse power; accordingly the calculation will stand thus : $24 \times 24 = 576 \times 7854 = 452,39 \times 220 = 99525,80 \times 7 = 689680,60 \div 33000 = 21,2$ horse power.

"There is another way of calculating the power : a horse is supposed to draw 200lb. at the rate of $2\frac{1}{2}$ miles an hour, or 220 feet per minute with a continuance, drawing the weight over a pulley, such as winding coals out of a pit. Now $200 \times 220 = 44000$ lb. at 1 foot high per minute, or 1 lb. at 44000 feet per minute ; then taking the above Cylinder by this rule, $99525,80 \times 10 = 995258,00 \div 44000 = 22,6$ horse power, being higher than the former method.

"It is now found in practice, that with sufficiently large openings and plenty of cold water, a vacuum can be made to average 12.80, and at this rate a 24 inch Cylinder would be 29,255 horse, being 8.45 horse power gained. The steam ports should be in proportion to the contents and not to the area alone."

"As the pressure of the atmosphere in round numbers is 15lb. upon a square inch, and the specific gravity of pure mercury is 14000, and of ordinary mercury 13600 ; but as mercury is seldom pure, taking a medium at 13800, it will rise in the barometer usually attached to the condensers of Steam Engines, 2 inches for every lb. of vacuum, so that a vacuum of 28 inches in the barometer will be 14lb. in the condenser ; and if a perfect vacuum could be made, would be 30 inches, or 15lb. ; but this will by no means give a true result for the cylinder, and we have seen 3lbs. of difference between the vacuum of the condenser, and that of the cylinder, on account of the passages being too small."

"If the Engine can be made to work without the shafts, its own frictions may be ascertained : in the same manner, by the Diagram, also the friction of the shafts or any particular flat of machinery. The friction of the Engine will vary according to the simplicity of construction, the height and distance the water has to be brought, and the order in which its parts are kept : in general it will be $1\frac{1}{2}$ or 2lbs. for every square inch of the area of the piston. The various qualities of oils may be tried in the same manner. In a Cotton Factory in Glasgow, the Engine was supposed to be overloaded, and drove the works with great difficulty, till a better kind of oil was used, when the effective power required was reduced 2lbs. upon the square inch.

"The Instrument will apply equally well to the condenser, or pumps, by having a cock made to fit it in any convenient situation, and will answer all the purposes of the mercury barometer, and also to try the pressure of steam in the boiler, when it does not exceed 9lb. upon the inch.

"It will be necessary to use a Diagram in all trials, as the degree of vacuum will be pointed out by the index and scale, and unless there has been some alteration in setting the valves, or in the quantity of cold water, will be pretty uniform. A scale accompanies the instrument,

divided into 10ths of an inch, representing pounds, one of the divisions at the end is divided into 5, and by estimating the half between the division will be 10ths of a pound."

The following table shows the average workings of the British Queen Steam Ship, from the time of her leaving Portsmouth until her arrival in N. Y. in Nov. last.

November.	Pressure of Steam, per sq. inch.	Expansion Valves, showing at what part of the stroke the cut off took place.	Degree of va- cuum on the condensed side of the piston.	Revolutions of the Engine per minute.	Speed of the Ship in knots per hour.	Consumption of coals per hour.	Consumption of coals per day.
	Lbs.		Inches			Cwts. Qrs.	Tons. Cwts.
4	4 7	2-8 cut off.	29 $\frac{1}{4}$	10 4	7 6	23 3	28 2
5	4 9	2-8	29 $\frac{1}{4}$	9 5	6 4	25	30
6	4 6	2-8	29 $\frac{1}{4}$	11 7	8 4	26	31 4
7	4 9	2-8	29 $\frac{1}{4}$	11 3	8 4	24	28 16
8	4 8	2-8	29 $\frac{1}{4}$	10 8	7 6	24	28 16
9	5 0	2-8	29 $\frac{1}{4}$	12 3	9 4	28	33 12
10	4 8	2-8	29 $\frac{1}{4}$	12 5	8	25 2	30 12
11	4 8	3-8 ^{11 to 12} A. M.	29 $\frac{1}{4}$	11	7 2	26	31 4
12	4 8	2-8	29 $\frac{1}{4}$	11	7 6	27	32 8
13	4 9	2-8		9	5 4	19 2	23 8
14	4 7	2-8		8	4 4	18	21 12
15	4 6	2-8		8 8	5 4	19	22 16
16	4 8	2-8	29 $\frac{1}{4}$	12	7 6	27	32 8
17	4 9	2-8	29 $\frac{1}{4}$	12	9	27	32 8
18	4 5	4-8 ^{10 to 12}	29 $\frac{1}{4}$	12 8	9 2	27 2	33
19	4 8	4-8 ^{12 to 1}	29 $\frac{1}{4}$	12	9	27 2	33
20	3 3	^{4-8 8 hours} 3-8 8 "	29 $\frac{1}{4}$	13	9 2	28	33 12
21	4 6	3-8 18 "	29 $\frac{1}{4}$	12 5	7 4	27 1	32 14
22	4 7	3-8 14 "	29 $\frac{1}{2}$	14 3	8 4	31 2	37 16
23	4 8	^{4-8 4 hours} 5-8 18 "	29 $\frac{1}{2}$	15 01	10 2	33	38 12
Consumed from noon till arriving in New-York...							16
" between London and Portsmouth.....							70
Total consumption.....Tons,							702

Mr. P. R. HODGE, of this city, is now engaged in constructing a High Pressure Indicator, similar to that of the British Queen; and from his well known practical knowledge, we are led to expect a very perfect instrument. Ed.

The following table shows the force the vapor or uncondensed steam exerts in resisting the descent or ascent of the piston, which will be according to the temperature of the water discharged by the air pump.

Fahrenheit Temperature.	Force in Inches of Mercury.		Lbs.*
	URE.	DALTON.	
32	0,200	0,200	0,100
40	0,250	0,263	0,128
50	0,360	0,363	0,181
55	0,416	0,443	0,215
60	0,516	0,524	0,260
65	0,630	0,616	0,311
70	0,726	0,721	0,361
75	0,860	0,856	0,428
80	1,01	1,01	0,505
85	1,17	1,17	0,585
90	1,36	1,36	0,680
95	1,64	1,58	0,805
100	1,86	1,86	0,900
105	2,10	2,18	1,07
110	2,53	2,53	1,26
115	2,82	2,92	1,43
120	3,30	3,33	1,50
125	3,83	3,79	1,92
130	4,36	4,34	2,17
135	5,07	5,00	2,52
140	5,77	5,74	2,88
145	6,60	6,53	3,28
150	7,53	7,42	3,74
155	8,50	8,40	4,22
160	9,60	9,46	4,76
165	10,80	10,68	5,37
170	12,05	12,13	6,04
175	13,55	13,62	6,75
180	15,16	15,15	7,58
185	16,90	17,00	8,47
190	19,00	19,00	9,50
195	21,10	21,22	10,58
200	23,60	23,64	11,81
205	25,90	26,13	13,01
210	28,88	28,84	14,43
212	30	30	15

* See pages 48 and 49.

Table of the Square Inches in the Area of Cylinders, for Diameters from 4 to 60 Inches inclusive.

Diameter in inches, halves and quarters.	Area in inches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.	Diameter in inches, halves and quarters.	Area in in- ches and parts.						
4	12,56	11	95,03	18	254,47	25	490,87	32	804,25	39	1194,59	46	1661,91	53	2206,18	60	2827,44	67	3511,76	74	4688,86	81	5747,81	88	6799,02	95	7847,81	102	8896,81	109	9947,81	116	11000,00		
4,25	14,18	11,25	99,35	18,25	261,59	25,25	500,74	32,25	816,87	39,25	1209,96	46,25	1680,02	53,25	2226,60	60,25	2843,00	67,25	3528,00	74,25	4705,10	81,25	5774,05	88,25	6825,25	95,25	7874,05	102,25	8923,05	109,25	9997,05	116,25	11056,25		
4,5	15,90	11,5	103,82	18,5	268,80	25,5	510,71	32,5	829,58	39,5	1225,42	46,5	1698,23	53,5	2247,81	60,5	2859,25	67,5	3549,25	74,5	4726,35	81,5	5791,40	88,5	6846,50	95,5	7891,40	102,5	8940,40	109,5	10009,40	116,5	11069,40		
4,75	17,71	11,75	108,38	18,75	276,12	25,75	520,77	32,75	842,39	39,75	1240,98	46,75	1716,54	53,75	2269,02	60,75	2880,75	67,75	3570,75	74,75	4743,85	81,75	5813,90	88,75	6869,75	95,75	7913,90	102,75	8959,75	109,75	10018,90	116,75	11078,90		
5	19,63	12	113,10	19	283,53	26	530,93	33	855,30	40	1256,64	47	1734,95	54	2290,22	61	2911,43	68	3591,43	75	4761,43	82	5821,43	89	6881,43	96	7931,43	103	8981,43	110	10061,43	117	11111,43	124	12161,43
5,25	21,64	12,25	117,86	19,25	291,04	26,25	541,19	33,25	868,31	40,25	1272,40	47,25	1753,45	54,25	2311,43	61,25	2931,43	68,25	3611,43	75,25	4778,88	82,25	5838,88	89,25	6898,88	96,25	7948,88	103,25	9038,88	110,25	10078,88	117,25	11128,88		
5,5	23,75	12,5	122,72	19,5	298,65	26,5	551,55	33,5	881,42	40,5	1288,25	47,5	1772,06	54,5	2332,63	61,5	2952,63	68,5	3632,63	75,5	4796,33	82,5	5856,33	89,5	6916,33	96,5	7966,33	103,5	9048,33	110,5	10088,33	117,5	11138,33		
5,75	25,96	12,75	127,68	19,75	306,36	26,75	562,00	33,75	894,62	40,75	1304,21	47,75	1790,76	54,75	2353,84	61,75	2973,84	68,75	3653,84	75,75	4819,88	82,75	5874,88	89,75	6937,88	96,75	7987,88	103,75	9059,88	110,75	10108,88	117,75	11148,88		
6	28,27	13	132,73	20	314,16	27	572,56	34	907,92	41	1320,26	48	1809,56	55	2375,83	62	2997,83	69	3675,83	76	4839,88	83	5899,88	90	6959,88	97	8019,88	104	9079,88	111	10128,88	118	11158,88	125	12178,88
6,25	30,67	13,25	137,89	20,25	322,06	27,25	583,21	34,25	921,32	41,25	1336,41	48,25	1828,41	55,25	2397,04	62,25	3017,04	69,25	3717,04	76,25	4856,33	83,25	5918,33	90,25	6978,33	97,25	8038,33	104,25	9088,33	111,25	10138,33	118,25	11168,33		
6,5	33,17	13,5	143,14	20,5	330,06	27,5	593,96	34,5	934,82	41,5	1352,66	48,5	1847,26	55,5	2419,03	62,5	3037,03	69,5	3737,03	76,5	4875,88	83,5	5939,88	90,5	6999,88	97,5	8059,88	104,5	9108,88	111,5	10148,88	118,5	11178,88		
6,75	34,78	13,75	148,49	20,75	338,16	27,75	604,81	34,75	948,42	41,75	1369,00	48,75	1866,26	55,75	2441,02	62,75	3057,02	69,75	3757,02	76,75	4894,88	83,75	5959,88	90,75	7019,88	97,75	8079,88	104,75	9118,88	111,75	10158,88	118,75	11188,88		
7	38,48	14	153,94	21	346,36	28	615,75	35	962,12	42	1385,44	49	1885,74	56	2463,01	63	3077,01	70	3757,01	77	4913,86	84	5979,86	91	7039,86	98	8099,86	105	9118,86	112	10168,86	119	11198,86	126	12228,86
7,25	41,28	14,25	159,49	21,25	354,66	28,25	626,80	35,25	975,91	42,25	1401,99	49,25	1894,48	56,25	2485,01	63,25	3097,01	70,25	3777,01	77,25	4932,86	84,25	5999,86	91,25	7059,86	98,25	8119,86	105,25	9128,86	112,25	10178,86	119,25	11208,86		
7,5	44,17	14,5	165,13	21,5	363,05	28,5	637,94	35,5	989,80	42,5	1418,63	49,5	1924,23	56,5	2506,99	63,5	3117,99	70,5	3797,99	77,5	4949,86	84,5	6019,86	91,5	7079,86	98,5	8139,86	105,5	9138,86	112,5	10188,86	119,5	11218,86		
7,75	47,17	14,75	170,87	21,75	371,54	28,75	649,18	35,75	1003,79	42,75	1435,36	49,75	1943,86	56,75	2528,98	63,75	3137,98	70,75	3817,98	77,75	4962,86	84,75	6039,86	91,75	7099,86	98,75	8159,86	105,75	9148,86	112,75	10198,86	119,75	11228,86		
8	50,26	15	176,71	22	380,13	29	660,52	36	1017,88	43	1452,90	50	1963,50	57	2551,76	64	3157,76	71	3837,76	78	4975,86	85	6059,86	92	7119,86	99	8179,86	106	9158,86	113	10208,86	120	11238,86	127	12288,86
8,25	53,45	15,25	182,65	22,25	388,82	29,25	671,96	36,25	1033,06	43,25	1469,14	50,25	1983,13	57,25	2573,75	64,25	3177,75	71,25	3857,75	78,25	4988,86	85,25	6079,86	92,25	7139,86	99,25	8199,86	106,25	9168,86	113,25	10218,86	120,25	11248,86		
8,5	56,74	15,5	188,69	22,5	397,61	29,5	683,49	36,5	1046,35	43,5	1486,20	50,5	2002,77	57,5	2596,53	64,5	3197,53	71,5	3877,53	78,5	4999,86	85,5	6099,86	92,5	7159,86	99,5	8219,86	106,5	9178,86	113,5	10228,86	120,5	11258,86		
8,75	60,13	15,75	194,83	22,75	406,49	29,75	695,13	36,75	1060,73	43,75	1503,30	50,75	2022,40	57,75	2619,30	64,75	3217,30	71,75	3897,30	78,75	5011,41	85,75	6119,86	92,75	7179,86	99,75	8239,86	106,75	9188,86	113,75	10238,86	120,75	11268,86		
9	63,61	16	201,06	23	415,48	30	706,86	37	1075,22	44	1520,53	51	2042,82	58	2642,08	65	3237,08	72	3917,08	79	5023,97	86	6139,86	93	7199,86	100	8259,86	107	9198,86	114	10248,86	121	11278,86	128	12298,86
9,25	67,19	16,25	207,39	23,25	424,56	30,25	718,69	37,25	1089,79	44,25	1537,86	51,25	2062,46	58,25	2664,86	65,25	3257,06	72,25	3937,06	79,25	5035,97	86,25	6159,86	93,25	7219,86	100,25	8279,86	107,25	9208,86	114,25	10258,86	121,25	11288,86		
9,5	70,88	16,5	213,83	23,5	433,74	30,5	730,62	37,5	1104,47	44,5	1555,29	51,5	2082,88	58,5	2687,63	65,5	3277,06	72,5	3957,06	79,5	5048,08	86,5	6179,86	93,5	7239,86	100,5	8299,86	107,5	9218,86	114,5	10268,86	121,5	11298,86		
9,75	74,66	16,75	220,35	23,75	443,01	30,75	742,64	37,75	1119,24	44,75	1572,81	51,75	2103,30	58,75	2710,41	65,75	3297,06	72,75	3977,06	79,75	5060,19	86,75	6199,86	93,75	7259,86	100,75	8319,86	107,75	9228,86	114,75	10278,86	121,75	11308,86		
10	78,54	17	226,98	24	452,39	31	754,77	38	1134,12	45	1590,44	52	2123,72	59	2733,97	66	3317,06	73	3997,06	80	5072,30	87	6219,86	94	7279,86	101	8339,86	108	9238,86	115	10288,86	122	11318,86	129	12308,86
10,25	82,46	17,25	233,71	24,25	461,86	31,25	766,99	38,25	1149,09	45,25	1608,16	52,25	2144,14	59,25	2756,75	66,25	3337,06	73,25	4017,06	80,25	5084,41	87,25	6239,86	94,25	7299,86	101,25	8359,86	108,25	9248,86	115,25	10298,86	122,25	11328,86		
10,5	86,55	17,5	240,53	24,5	471,44	31,5	779,31	38,5	1164,16	45,5	1625,97	52,5	2164,56	59,5	2780,31	66,5	3357,06	73,5	4037,06	80,5	5096,53	87,5	6259,86	94,5	7319,86	101,5	8379,86	108,5	9258,86	115,5	10308,86	122,5	11338,86		
10,75	90,71	17,75	247,45	24,75	481,11	31,75	797,73	38,75	1179,33	45,75	1643,89	52,75	2184,98	59,75	2819,58	66,75	3377,06	73,75	4057,06	80,75	5108,64	87,75	6279,86	94,75	7339,86	101,75	8399,86	108,75	9268,86	115,75	10318,86	122,75	11348,86		

FOREIGN INVENTIONS NOT PATENTED.

INDICATOR OF THE LEVEL OF WATER IN BOILERS. M. Pascot has invented an instrument, something on the principle of Leslie's differential thermometer, to inform one of the height of water in boilers. It consists of a recurved tube, and containing a liquid, open at both ends, of which one end is in communication with the upper interior of the boiler, and the other with the lower. The difference of pressure at the two ends is obviously due to the height of water in the boiler, and therefore measured by the height of the liquid in the tube.—*Railway Magazine*.

We must confess our ignorance of the cause why, under this arrangement, the pressure should not be the same whether received from the upper or lower interior of the boiler.—ED.

WIRE SEWN BOOTS AND SHOES. In the *Bulletin d'Encourt*, Sept. 1839, it is announced that M. Seller of Paris, had secured a patent for the right of using brass wires for attaching the upper leather to the welt of boots and shoes. This metallic thread, he asserts, allows neither moisture nor dust to enter the shoe, nor does it rip. The sewing is performed with as much ease as with waxed thread, nor is the work more costly.

BRICKS. A machine has lately been introduced on the extensive works of James Hunt, Esq. of Rowden Hill, near Chippenham, for making bricks, which has excited much curiosity. The cylinders revolve about once a minute, making, in the course of such revolution, thirty two bricks.—*Taunton Journal*.

GAS PIPES, DISPENSED WITH. In Vienna, at present, according to a simple and perfectly secure method invented by M. F. Derionet, gas is conveyed in hermetically sealed bags, on carriages constructed for the purpose, from the manufactory to all parts of the town, daily; by which the expense of laying down pipes in the street is avoided, and the article supplied to the consumer at a proportionably reduced rate. This plan would offer immense advantages to the companies in London and other large manufacturing cities, by saving the great cost of their miles of pipe, and the immense expense of supplying the gas to each house.—*Inventor's Advocate*.

The above appears so well authenticated that we are compelled to believe it; but the eventual saving must be very doubtful, unless the bags will carry themselves.—ED.

IMPROVED SAFETY LAMP. A valuable improvement on the safety lamp has been suggested by Mr. Price, of Gateshead. It consists in

placing what is called a "bull's eye" in the side of the wire gauze, and surrounding it by a metallic reflector, by which the light is concentrated, and its effects increased six fold. To guard the lamp from accident, it may be fitted into an iron box, with an open side. For obviating the great and acknowledged defect of the present lamp, viz. the insufficiency of light, and still preserving its important advantages, Mr. Price's invention seems exceedingly well adapted.—*Newcastle Jour.*

PAPER. Messrs. Dickinson & Co. paper makers, London, manufacture paper, interwoven with threads of silk; and it has been proposed to use this paper for envelopes under the new system of penny postage.

The Trenton Banking Co. New Jersey, have used paper of this description for many years.—**ED.**

NEW MUSICAL INSTRUMENT. Decidedly one of the most ingenious musical instruments for years presented to the public, has been lately invented by Mr. Jenkinson, the organist of Lurgan church. The principle though not altogether novel, is improved upon in a manner quite unique. It consists of a large violin body, without neck or finger board, placed horizontally on a frame, having a greater number of strings than the violoncello, which are acted on by a bow at the one end, and a key board, as in the pianoforte, answering to the left hand of the violin player. The entire of the strings are at once under the movement of the bow, and to avoid the discordant effect which must ensue when a piano tone is required, any string is made removable at pleasure, from the touch of the bow by the simple contrivance of a few treadles wrought with the foot, and connected with a damper in the inside of the instrument. One great beauty of the invention is, that by the judicious disposition of the stops, each one produces the full chord of any key in which the performer thinks proper to play. The tone is most powerful, and from the vast variety of notes capable of being produced, it forms one of the best orchestral instruments which we have seen. The writer heard it accompanying a grand piano, and the tone of the latter, in some instances, was wholly drowned by the strength of Mr. Jenkinson's instrument.—*Belfast News Letter.*

Most instruments, thus formed, have been found impracticable, from the difficulty of tuning them, or of preserving them in tune.—**ED.**

RIDDLE'S SPIRAL EVER POINTED PENCIL. Riddle's, or S. Mordan & Co's. patent ever-pointed pencil cases are in the hands of every one who can afford to use so very convenient an instrument for writing; but defect has always been obvious in the tendency of the "motion" part to get loose and out of order. Mr. G. Riddle has very lately perfected a pencil case, by which this is completely prevented, nothing external being able to come in contact with the motion. The appear-

ance of the case is perhaps neater than that of cases on the old principle, while it has all the advantages, in the reserve of leads, &c. which they possessed. We think it will displace them from the public favor. A writer in the *Inventor's Advocate or Patentee's Recorder* speaks most favorably from experience of this spiral pencil.

Messrs. Lownds & Co. of Philadelphia, have manufactured an article similar to the above for several years.—ED.

IMPORTANT DISCOVERY. It seems that Mr. Rogers, during a course of chemical studies, undertaken to beguile the pain and tedium of a protracted illness, has hit upon an invention which is likely to prove of great national and domestic importance. He has found that the *Anthracolite* amalgamated with another substance equally cheap and common, acquires the extraordinary property of *effectually* and *certainly* preventing the oxidations of metals under all circumstances. Thus an article of the highest polished steel may be exposed to the air or water, for any length of time, and brass and copper surfaces *immersed in acids* without the slightest trace of oxydation becoming perceptible. The great importance of this discovery will be manifest in the fact as appears from a calculation of Dr. Dolton's, that more than a million sterling is lost by individuals and the public yearly, through the destruction of various descriptions of machinery, military stores, arms, &c. &c. by oxidation. We understand that Mr. R. does not attempt to offer any *rationale*, of the above singular effect, but inclines to an *opinion* that it is the result of some obscure galvanic action. The experiments will be tested at the next meeting of the British Association, preparatory, we believe, to an application to parliament on the subject.

West Briton Advocate.

The present method, used by the Sheffield and Birmingham manufacturers to prevent oxidation, is to immerse the polished parts of cutlery in lime water, and dry them rapidly. This proves fully sufficient to prevent rust during an Atlantic voyage.—ED.

MATERIAL FOR LIGHTING. An interesting experiment was made at Bordeaux a few days ago, in the presence of the Mayor, on the husks of grapes when pressed, and the lees of the wine, in order to show their use for the purpose of lighting. A pound of the dried husks put into a red-hot retort gave, in seven minutes, two hundred litres of carburetted hydrogen gas, free from smell, and which burnt with an intense light, and free from smoke. A second experiment with the dried lees was equally satisfactory.

CANDLES. A French chemist has discovered a mode of making tallow candles to resemble wax candles, both in color and in burning. The process employed to convert the tallow into white wax is very ingenious. It consists of various operations of boiling, purifying, and

pressing. An hydraulic press, wrought by a steam engine is used. While the pressure is applied, a dark yellow oil is squeezed from the tallow; the expulsion of the oil leaves the substance of the tallow hard and white like wax. So close is the resemblance which these compressed tallow candles have to wax candles, that no person, without a close examination, could discover the difference, and they are only one half the price. Large quantities are now manufactured at an establishment in London. They are unquestionably a great improvement, and must soon supersede the common tallow candle.—*Manchester Herald*.

The above bears a strong resemblance, so far as can be collected from the description, to the stearine candles, which have long been made from tallow, and are now manufactured in this country from the refuse of whale oil,—technically called *whale oil foot*.—ED.

CLOTH MAKING WITHOUT SPINNING OR WEAVING. Among the many extraordinary and truly wonderful inventions of the present times, is a machine for the making of broad or narrow woollen cloths without spinning or weaving; and from our acquaintance with the staple manufacture of this district, after an inspection of patterns of the cloth, we should say there is every probability of this fabric superseding the usual mode of making cloth by spinning and weaving. The machines are patented in this and every other manufacturing nation. The inventor is an American, and appears to have a certain prospect of realizing an ample fortune by the sale of his patent right. We understand patterns of this cloth, as well as a drawing of the machinery, have been shown to many of our principal merchants and manufacturers, none of whom have expressed a doubt but that the machinery appears capable of making low cloths which require a good substance. Should it succeed to anything near the expectation of the patentees, its abridgement of labor, as well manual as by machinery, will be very great. We find that means are already taken to introduce this machine among our continental rivals: a company of eleven gentlemen in London, have deposited five thousand pounds with the patentees, who have ordered a machine for them; when finished they are to try it for one month, and if at the end of that time they think it will succeed, they are to pay twenty thousand pounds for the patent right in the kingdom of Belgium, and it will of course be worked there. We are therefore bound, in duty to our country and her manufacturing interests, to adopt such facilities as will prevent us from falling into a position below our rivals in other countries. We are informed that the machinery for the production of this patent woollen felted cloth will be tried here in a week or two, under the superintendence of the inventor, by a cloth merchant who has an exclusive license, but is about to associate with him twenty other respectable business men, for the purpose of sharing the expenses of giving the invention a fair trial. It is calculated that one set of machinery, not costing more than six hundred pounds, will be capable of producing six hundred yards of

woollen cloth, thirty six inches in width, per day of twelve hours.—*Leeds Mercury*.

Carpets have been manufactured, for some years, on a similar plan, by Mr. Haight, of this city.—ED.

RAILROAD SPEED ON THE WATER. A nautical gentleman is about to come forward with a new application of steam to purposes of navigation, by means of which, without paddles or an external apparatus, he undertakes to carry vessels through the water as swiftly as carriages pass along railways on land. He calculates that his discovery will enable the voyagers to pass with ease from Dover to Calais in an hour.—*Dublin Mail*.

The proposer does not appear to be aware, that at a greater speed than thirty two miles an hour, the boat would carry a body of water along with it equal to itself in size. The only attempt, even theoretically, which promises to do away with this difficulty, will be found in William Van Loan's patent for a marine railway, granted January 15th, 1831.—ED.

MACHINE FOR BEATING HEMP. M. Decosten has invented a new machine for beating hemp, which accomplishes its object in a speedy, complete, and economical manner; this machine is at present employed at the spinning factory of Pont-Remy, department of the Somme. Under the system at present in use one man cannot prepare more than fifteen pounds of hemp per diem, and even that but imperfectly; with the new machine he can prepare one hundred and fifty pounds, and the operation is much better performed. This invention, although applicable to the preliminary steps in spinning, may effect a sort of revolution in that trade; for the machine is said to be cheap and of very simple construction.—*Reading Mercury*.

NEW ENGINE. A gentleman of Liverpool announces that he has invented a new engine, immensely superior in every respect to the old steam engine. The power is created by air and steam. It will consume only one half the quantity of fuel of the old one; and the rapidity by which a vessel propelled by it will sail, will enable it to perform a passage to America in six days. Owing to a particular way in which the power acts upon the vessel, twenty miles per hour can be realized with the greatest possible ease. The weight of machinery will be only one-half that required by the old steam-engine, and instead of straining and weakening the ship, will brace and strengthen it. By this method the steam power is more than doubled.—*Reading Mercury*.

So far as can be surmised from this loose description, the above appears similar to Bennett's plan, which has been in *experimental use* on the Hudson for two years.—ED.

STEAM LOCOMOTION, by M. Dietz, adapted to common roads. In this machine, the steam does not act directly on the axle of the locomotive, but is supported by six wheels; besides which the engine has a free oscillation by means of powerful springs; two other wheels of greater diameter placed between the engine and the carriage, for the purpose of combining the action, serve to communicate throughout the system the impulse which they themselves have received from the motive power by the means of a never-ending chain.—*Reading Mercury*.

This invention is so badly described that we cannot venture an opinion as to its merits. Never-ending chains have always been found a never-ending cause of accidents with locomotives.

ED.

PORTABLE BAROMETER. A new portable barometer, by M. Bunten, is the subject of a report by M. Arago, to the Academy of Science at Paris. This new machine, without any copper case, and without a plate to mark the degrees, is still very simple, more convenient, cheaper, and less subject to fracture than other barometers. Instead of the case marked with the degrees, the degrees are engraved on the tube itself. A shifting piece supporting the *vernier* is used to mark precisely the height to which the mercury rises; the cistern is of iron, which may be screwed and unscrewed at pleasure, either to lengthen or shorten the column for the purpose of neutralizing the change of temperature. This barometer will cost about seventy francs, including its wooden case, which forms a stand; whilst the cost of common barometers used by travellers is about two hundred francs.—*Reading Mercury*.

INGENIOUS INVENTION. We have before us one of the most remarkable contrivances we have of late seen. It is a specimen of a pair of skates, invented by Mr. William Wallace of Newtownards, watchmaker, and is in the highest degree creditable to that gentleman's scientific skill and perseverance. The machinery of this little locomotive is so arranged, that it is equally serviceable on ice or on a smooth footpath, (a flagged footway, for instance.) It consists of two perpendicular plates of iron, with pieces inserted between them, to allow a free rotary motion for three wheels, revolving along the extent covered by the foot. These wheels revolve in the action of skating, and, with the addition of a horizontal plate of wood, elevates the sole of the foot above the surface. There is, also, a large wheel at the toe-end, with a ratchet or click-wheel attached, on the outside of one of the perpendicular plates, for the purpose of keeping the one foot from retrograding, while the other is progressing forward. After having seen this machine, we are somewhat surprised that a mechanical idea of the same kind has not before suggested itself to some of our ingenious countrymen.—*Belfast Whig*.

A similar contrivance is used by the Ravel family in their representation of "the Skaters of Wilna."—ED.

A TRANSPARENT WATCH. A watch has been presented to the Academy of Sciences at Paris, principally formed of rock crystal. The internal works are visible; the two-teethed wheels which carry the hands are rock crystal; the other wheels are metal, to prevent accidents from the breaking of the springs. All the screws are fixed in crystal, and all the axes turn on rubies. The escapement is of sapphire, the balance-wheel of rock crystal, and its springs of gold. The regularity of this watch as a time-keeper is attributed by the maker to the feeble expansion of the rock crystal on the balance-wheel.—*Coventry Herald*.

THE GURNEY LIGHT. The chapel was lighted by a single Bude light, suspended from the centre of the cieling, which diffused ample illumination throughout every part of the chapel, of a beautiful pure white light, and its effect was agreeable in the highest degree. Upwards of a thousand persons were present.—*Sheffield Independent*.

IMPROVED LAMP FOR STEAM VESSELS. On Wednesday evening, the Polyphotal lamp, and reflector of single curvature, for steam vessels and other purposes, the invention of Mr. Scott Russell, A. M. was shown at the rooms of the Society of Arts, where it excited much interest. We understand that through the kindness of Mr. Hamilton, of the general steam navigation company, it is to be exhibited on trial to-night, on board a small steam vessel, which will leave Newhaven at seven o'clock, and will ply between Granton pier and Leith. Messrs. Smith & Co. oilmen, and lamp makers to the Queen, 1 Blair street, mention that the effect of the light will be of the greatest advantage on board vessels in observing objects on the sides, and at a distance.—*Edinburgh Courant*.

MARINE STEAM ENGINE BOILERS. M. Cousté proposes to adapt an apparatus to the boilers of marine engines, supplied with salt water, by which the crystals of common salt are removed as fast as they are deposited on the heated surfaces of the inside of the boiler; and he hopes by his invention to avoid the loss of heat, which is occasioned by the process at present employed for getting rid of the salt, in blowing off a quantity of the hot saturated solution at stated intervals.

Hall's condensers for re-supplying the water to boilers are likely to prevent the necessity for M. Cousté's invention.—Ed.

STEAM AND ITS APPLICATIONS.

The Steam Engine.—The following account of the ingenious invention of Hero, of Alexandria, makes one regret the causes which diverted men's minds during so many ages from following it up to its ultimate results. Had steamboats and railroads been in operation for the last two thousand years, how different would be the present state of the human race! I find the first example of motion produced by steam in a toy much more ancient than the organ of Gerbert, viz. in the *Eolipyle*, of Hero, of Alexandria, the date of which ascends to one hundred and twenty years before our era. It will perhaps be difficult, without the

help of figures, to give a clear conception of the mode in which this little piece of apparatus acts; but I shall nevertheless make the attempt. When a gas escapes in a given direction from the vessel which contains it, this vessel has a tendency to move in a diametrically opposite direction, owing to the force of the reaction. The recoil of a musket when discharged is nothing more than this. The gas produced by the inflammation of the saltpetre, charcoal, and sulphur, issues into the air in the direction of the barrel; that direction prolonged backwards, abuts at the shoulder of the person who has discharged it, and it is upon the shoulder, therefore that the gunstock acts with violence. To change the direction of the recoil, all that is necessary is to change the direction in which the gas issues. If the barrel, closed at its extremity, were pierced by a lateral opening at right angles to its direction and horizontal, it would be laterally and horizontally that the gas of the powder would escape,—it would be at right angles that the barrel would produce its recoil; and it would be upon the arm, and not upon the shoulder, that it would be felt. In the former instance, the recoil operates upon the individual who has fired the piece, from before backwards, with a tendency to throw him down; in this latter instance, it would have a tendency to make him whirl round upon himself. Were we then to attach the barrel, constantly, and in a horizontal position, to a moveable vertical axis, at the moment of being discharged it would more or less change its direction, and would cause that axis to revolve upon itself. Still maintaining the same arrangement; suppose now, that the vertical rotative axis is hollow, but closed at its upper extremity; that it abuts at its lower extremity, like a sort of chimney in a boiler producing steam, and that, moreover, there exists a free lateral communication between the interior of the axis and the gun-barrel, so that the steam, after having filled the axis, penetrates into the barrel, and issues from it at the side by its horizontal opening; then this steam, in escaping, will act, except in the degree of its intensity, in the same manner as the gas disengaged from the powder in the gun-barrel which was stopped at its extremity and pierced laterally; only, that in this instance, we shall not have a simple shock merely, as happens in the violent and instantaneous explosion of the musket; but on the contrary, the rotatory motion will be uniform and continuous, as the cause which produces it; and, finally, were we, instead of having a single musket, or rather a single horizontal pipe, to adapt a number of them to a rotary vertical tube, then we should have before us, with some unessential differences, the ingenious apparatus of Hero, of Alexandria.—*Arago's Life of Watt.*

Steam Vessels.—The total number of British and Irish steam vessels amounts to seven hundred and fifty-six; of these four hundred and eighty four may be considered as river steamers and small coasters; and two hundred and sixty two as large coasters and sea going ships. The computed tonnage is one hundred and forty thousand seven hundred and eighteen, and the horse power of the engines fifty-six thousand four hundred and ninety. The increase of steamers in 1837 over 1836, was seventy-eight; and that of 1838 over 1837, fifty nine registered vessels. From a report presented to the American

Congress in December last, we learn that the whole number of steam-boats in the United States was then estimated at eight hundred, which exceeds by thirty-four the number in the British Isles, but falls short by ten of the number in the British Isles and Colonies together. The tonnage of the American steamboats was one hundred fifty-five thousand four hundred and seventy-three, which is very little greater than the home British tonnage. The aggregate horse power of the engines was fifty seven thousand and nineteen, also very near ours. The three largest American steam-vessels were of eight hundred and sixty, seven hundred and fifty-five, and seven hundred tons, respectively.—*Leeds Mercury*.

The new steamboat Alice.—A fine iron steam-boat, the property of Lord Francis Egerton, was recently launched from the yard of Messrs. Page and Grantham. It is about one hundred and seventy tons burthen, old measurement, is neatly fitted up, and is a handsome and lively looking boat on the water. With the whole of her machinery, fuel, &c. on board, her draft of water is only four feet six inches. She has two engines of thirty horse power each, made by Messrs. Davenport and Grindrod, of the Caledonian Foundry, in this town, upon a novel and improved construction. Their peculiarity consists in the fixing of the cylinders on an angle of forty-five degrees in the form of a rectangle, with the hypothenuse at the base, so that they act as a stay and support to each other. No side levers or counterbalances are required; and, the working parts being fewer than in ordinary engines, they are less liable to derangement, and not so much exposed to wear and tear. These engines are exceedingly compact, and have realized all that was contemplated by the ingenious makers; ample power, ease in working, and great strength, combined with unusual lightness. A very short trip only was intended on this first occasion, but the speed of the vessel was so satisfactory, and the gratification of all on board consequently so great, that she proceeded up the river, a distance of twelve or fourteen miles and back, accomplishing the trip "out and home, in about two hours."—*Mercury*.

Glasgow and Liverpool Steam-ship Achilles.—We have had the pleasure of inspecting this new addition to the elegant steam craft for which the Clyde is so justly celebrated, and will venture to affirm, that a more splendid or more unique specimen of naval architecture is not at this moment afloat anywhere. "throughout the world's vast range." For gorgeousness of effect; for tasteful decoration; for an admirable combination of the *dulce et utile*; the Achilles excels every thing of the kind it has been our fortune to encounter. Greenock has the honor of her construction, having been launched from the yard of Mr. Robert Steele, one of the most famous ship-builders on the Clyde. We have not taken the trouble to ascertain her exact dimensions; her length, her breadth, and depth; but to our eye her symmetry appears to be perfection itself. She has what is called a flush deck, with a rounded stern, and, looking from the wheel forward to the bends, the spectator is struck with something like astonishment and admiration at her great length; the view being uninterrupted by any intervening

object of comparative magnitude. Nor is this feeling lessened by a visit to the engine house. Descending by an elegant flight of steps, the visitor finds himself on a platform kind of gallery, which runs round three sides of the room, and is separated from the machinery by brass railing. At one glance we have all the complicated details of a ponderous machine of tremendous power in active operation. The engines we are told, although rated at four hundred and thirty horse power, are equal to the force of four hundred and ninety. They are the production of Messrs. Caird & Co. of Greenock, whose machinery will stand comparison with any in the world. A staircase on either side of the vessel conducts to the grand saloon, the vestibule of which is done up in imitation oak, in the Gothic style, which, altogether, has rather a sombre and subdued effect. Proceeding a little way towards the interior, the *coup d'œil* becomes positively magnificent. The whole of the walls and the doors leading to the sleeping cabins are composed of rosewood and ivory, and are decorated by pannels in *papiermaché* from the manufactory of Messrs. Jennens and Bettridge of Birmingham. As works of art, they have not, we believe, been surpassed by anything of the kind ever before produced in this country. The pannels are twenty eight in number, four of which are very large, and consist of historical subjects, some original, and others copies from the works of celebrated masters. The first represents the triumphal entry of Alexander into Babylon; the second exhibits the view of a Grecian seaport, and the arrival of a victorious fleet; the third describes the Olympic games, the combats of gladiators, &c.; the fourth gives a representation of the Hippodrome, the temple of victory and chariot races. Each of these subjects is depicted by the artist with the vividness and freshness of life. The various groups of Grecian, Egyptian, and Persian figures, the richness and brilliancy of the costumes, the colossal statues, temples, and columns, in their architectural grandeur and beauty, furnish a vivid representation of the barbaric pomp and magnificence of by-gone ages. The smaller pannels are divided into classes, devoted to the illustration of particular objects. The first series represents full length figures, emblematic of victory, commerce, and the arts and sciences, surrounded with beautiful ornamental work, drawn in imitation of *alto-relievo*: the whole surmounted with the arms of Liverpool and Glasgow. The second embraces mythological subjects, representing the triumph of Neptune, Juno, and the Graces, Acteon, &c.; the whole adorned with an emblematic framework. The third comprises mosaic heads, and emblems, ornamented with arabesque foliage, birds, flowers and fountains. Viewed separately, each of these paintings is an exquisite specimen of the advanced state of this department of our manufactures and the fine arts; and, as a whole, they form unquestionably one of the most unique and splendid collections of the kind ever produced. The saloon is lighted from above by two cupolas of stained glass, round the basements of which are delineated a variety of subjects, illustrative of the siege of Troy, from designs by Flaxman. In an alcove looking towards the stern end of the apartment, is placed a figure of Achilles, in the attitude in which he is generally represented. The fire places have ornamented marble mantle pieces, all finished in the first style of

the art, and the sleeping berths are admirably fitted up with a view to economy of space, elegance, and comfortable accommodation.—The interior decorations have been got up under the superintendence of Mr. A. S. Cleland, of this city, the architect and furnisher, and they certainly reflect great credit on that gentleman's taste and skill, both in design and execution. Such are a few of the leading features of this floating palace; to enumerate the whole would exceed the limits of a newspaper. We shall conclude, therefore, with expressing a hope that the good ship Achilles will secure an amount of public patronage in some degree commensurate with the spirit and enterprise of the owners, Messrs. Martin and Burns of Glasgow.—

Liverpool Standard.

The new steam ship "New-York."—The "New-York" is now on the stocks, at the yard of Messrs. Wilson, North Shore, and is rapidly advancing towards completion. She is a noble looking vessel; superior in tonnage to the Liverpool, belonging to the same company; is of a beautiful model, and built in as substantial a manner as any of Her Majesty's ships. The following are her dimensions; length over all, 235 feet; beam of the hull, 36 feet 6 inches; beam over paddle boxes, 60 feet; depth of hold 22 feet; tonnage, (supposed new measurement,) 1600; horse-power of engines 420. The frame of the New York is of English oak, the bends and clamps of English and African oak. Her bottom is of American elm, and Baltic timber. On the deck, the New York has a very noble appearance, from her length and beam, and her unencumbered deck room. It is remarkable that she is about the same length over all as the Liverpool, (235 feet,) and that her principal cabin will also be found the same length, (75 feet.) She has, however, 6 feet more beam than that favourite vessel, which it is considered will give her considerable advantages. It is expected she will be ready for launching in about a month, but may not perhaps be placed in her destined element, until early in the spring.—*Leeds Mercury.*

The President, Steam Ship.—This splendid vessel, which has, for some time past, been building in Messrs. Curling and Young's yard, Limehouse, (the builders of the British Queen,) will be launched on Saturday next, the 7th December. The President is the largest ship in the world. The dimensions are as follow:

	Ft.	In.
Length (extreme).....	268	0
Ditto for measurement.....	230	0
Ditto of keel	220	0
Breadth.....	42	0
Ditto, including paddle boxes.....	64	0
Depth in the hold midships.....	23	6
Height of upper deck.....	7	6
Diameter of paddle wheel.....	21	0
Draught of water with cargo.....	17	0
Burden in tons (old measurement).....	1,921	57-94
Weight of engine, boiler, &c.....	500	tons
Power of engine.....	600	horse.

Thus it appears, that the President is 126 tons larger, and has 100 horse power more than the British Queen.

The Glasgow Iron steam ship "Royal George."—This beautiful vessel, belonging to the Glasgow and Liverpool Royal Steam Packet Company, is now on her second trip between this port and that from which she sails; and as another, and a new and splendid specimen of what can be accomplished by our Scottish competitors in steam navigation, she has attracted much and deserved admiration. She is the second iron steam ship produced by the same proprietary, the Royal Sovereign, placed on the station a few months ago, being the first, and also a crack, we may say a twin, vessel. It is very natural for common observers to suppose that we, of Liverpool, entertain some slight feeling of jealousy at these advancements of our northern countrymen, who some hundred years ago were perhaps a hundred years behind us in matters of science and nautical enterprise. If, however, such a feeling ever found harbor for a moment within us, it was of that nature which resolves itself into generous rivalry, and which hails every mutual improvement that may tend to the advancement of mutual intercourse and commerce as a benefit attained not only for Great Britain, but, through her for the vast regions to which extend the ramifications of her internal traffic and manufactures. It is scarcely possible to estimate the advantages derived by a country, even though circumscribed in extent, from the facility and rapidity of transit derived from the agency of 'steam.' Steam, is indeed the moving power of the day. It is rapidly approximating town to town, state to state, continent to continent. Its advantages are developed more peculiarly in 'coasting' than in 'ocean' navigation, surprising and admirable as are its achievements in the last. About twenty years ago, a voyage hence to Glasgow, along a coast of two hundred miles in extent, was an undertaking of such peril, and generally of such delay, by sailing craft, that few persons could be induced to undertake it. Now, steamers of a large size, capable of contending with adverse winds and waves, and fitted up in a manner to gratify, in accommodation those who would recline in the very lap of elegance and ease, perform the voyage with the regularity, and more than the speed of mail coaches, over the same extent of ground, and at a cost too immeasurably below that of travelling by land in former or in modern times.

The Royal George is of about 500 tons burthen. She is 180 feet in length; 200 feet from the figure head to the taffrail; 22 feet 6 inches in beam, or 46 feet over the paddle boxes. Her engines are of 120 horses power. The diameter of the cylinder is 61 inches, length of stroke 5 feet. These engines are beautiful highly finished pieces of machinery, and were manufactured by Messrs. Todd & Macgregor, Glasgow. The saloon or principal cabin, is a very spacious and magnificent apartment. The entrance from the deck is exceedingly well contrived, there being a door and flight of steps on either side of the vestibule or 'companion,' leading to the landing at the top of the main stairs, so that in stormy weather, the windward door may be closed. The 'architectural' visitor on descending may anticipate the general style of the whole. The panneling of the stair case is finely painted in rosewood. The banisters are of polished brass, the rails of polished rosewood, and all bespeak the old English or Elizabethan, in its massiest and purest fashion. The folding doors leading to the saloon

are of rosewood; admirable specimens of the massive gothic; the styles are finely moulded, and the pannels are projected into the alto relievo beyond them. The dark color of the rosewood is relieved by massy floreated gilt hinge work and other ornaments of the same material. On entering the cabin, the visitor cannot fail to be struck with admiration. The apartment is about forty feet in length, and about twenty two in width, occupying the whole breadth of the vessel. It is lighted by three windows of plate glass on each side, by the stern windows, and by the square dome or deck lights. The style is massy gothic; and the whole of the wood work, including the walls and the furniture, is of choice dark and variegated rosewood, as a substitute or rather improvement upon oak. Between the side windows there are inserted gothic pannels of frames, with raised mouldings and interior gilded frames, for the reception of pictures in *papier maché*, in proportion, but now fitted up with crimson drapery. The mouldings and other decorations, including the trusses that form knees or brackets on the top of the pilasters, between the windows and the pannels, in the angle formed by each pilaster and the roof beam that rests upon it, are beautifully carved in open work and richly gilded. Some idea may be formed of the very liberal expenditure bestowed on this apartment, when we state that the gilding alone of one of these trusses cost six guineas and a half. They are of two patterns, one of each being placed alternately, and have a fine effect. The cornicing and beading is also gilded. Across the stern windows there is a fine transparency, a view of Windsor Castle, with the royal residents and their visitants in the foreground. Sofas or ottomans surround the apartment, divided by massy carved rosewood arms or elbows. These are of great width, and the backs reach to half the height of the cabin, forming a semicircle at the stern. They are cushioned in embossed crimson velvet of a peculiarly rich and appropriate fabric. The tables are also of rosewood, standing on massy single gothic pillars, and so contrived that though there is a space between, they may be elongated and form a 'festive board,' all around the room, in the form of a horse shoe. The chairs are in corresponding gothic style, of the choicest description. They are all solid rosewood, with cushioned seats and backs corresponding with the sofas. They probably weigh little short of 50lbs. and cost upwards of five guineas each. The roof is one of the most attractive portions of this beautiful saloon; between the beams it is decorated with tracery and graining most elaborately carved in alto. At the entrance there are two state rooms, one on each side, which narrow the saloon for a short distance from the door way. The architect has rendered this arrangement highly decorative. The roof formed between the two state rooms is of a semi-circular form. The door is in the centre, and on each side there is a sideboard of gothic design, richly carved in rosewood. Over these are mirrors, each of their perpendicular plates placed in concave position, with the segment formed by the wall where they are placed. The frames of these are of fine open gilded carved work. The doors of the two state rooms leading from the saloon, face the stern, and have been much admired. In the upper pannel of each there is a mirror with antique framework, surrounded and surmounted by gilded ornaments of exquisite design.

and execution. The two sky-lights are glazed with stained glass; each pane, twenty in all, containing a separate portrait of a British monarch, surrounded by rich gothic decorations. These were executed by Mr. Cooper of Edinburgh, who has discovered a new and admirable process by which to stain glass, for which he has taken out a patent. On the whole we should say that this cabin is the most costly and magnificent we have yet seen, and that the whole as well as the vessel, her engines, (by Messrs. Todd & Macgregor,) and her general equipments, are an honor to her proprietors, to the port from which she sails; indeed, to the country to which she belongs.

The ladies' and gentlemen's state rooms are fitted up on a scale of corresponding elegance and comfort; but we have not room on this occasion, to notice them in detail.

The Royal George, Captain Cooke, is of a beautiful model. She is so well put together (being 'as strong as iron can make her') that no vibration is felt by the motion of her engines; and she has already proved herself the fastest boat on a station, second to none in the beauty and swiftness of its steamers. So much for iron *versus* wood.—*Liverpool Standard*.

NOTICES.

"*The School Library*,"—It is a legitimate duty of all public journals to notice such individual or associated efforts, as are best calculated to promote the object they profess to have in view, viz: the diffusion of useful knowledge. In this they as effectually accomplish their proposed purpose, as if they were to give in detail the particulars which those efforts produced. If, then, by calling the public attention to the means by which the people may obtain useful information, our desired object can be attained, we shall hope to commend ourselves to our readers by doing so whenever our limits deny us the opportunity to communicate the results of those means. Among the most important and efficient means to disseminate knowledge, *School Libraries* stand pre-eminent. They are to operate like a mighty lever, on the public mind, and their effect will be as powerful, and as clearly seen and felt, in elevating public sentiment and intellect, as any one of the mechanical powers in overcoming the resistance of inert matter. The great state of New-York—truly in deed, the empire state—was the first to apply this all-important power to mind; and so grand was the scheme and so noble the effort, that others speedily followed the splendid example and emulated her in the magnificent enterprise. Massachusetts never behind any one of her sister states, in any thing which contributes to education, has commenced a series of works, under the title at the head of this notice, and which exhibits an array of talent, unequalled in this or any other country.

The Board of Education, under the auspices of which this galaxy of authors is shedding abroad a flood of light, unites a moral and intellectual force, no where else to be found. Already have numerous volumes, which, in matter and style, are incomparably superior to any other designed for a similar purpose, emanated from this source; and we cannot doubt that they will be adopted, wherever such libraries are required. To enumerate the eminent writers engaged in preparing these works, or to notice the merits which each published volume exhibits, the beautiful and perspicuous style in which they are executed, would require more space than we can now devote to these purposes. We can only refer to the works themselves, at the office, 126 Fulton st. where they are for sale, as we understand, for public or private libraries

Journal of the Franklin Institute.—We take pleasure in calling the attention to our valued collaborateur in the cause of Science and Art. The work fully maintains its high character for useful, practical information, valuable tables, ingenious theories, lucid descriptions, and important communications. We cordially wish it a continuance of the success which has hitherto attended it, and we shall be pleased to assist in keeping its merits before the public.

LIST OF PATENTS GRANTED DECEMBER 1839.

Richard Walker, of Portsmouth, Rockingham Co. Virginia, improvement in the Framework Knitting Machine. Patented 5th December, 1839.

Benjamin F. Smith, of South Hadley, Massachusetts, improvement in the construction of Fire Arms. Patented December 5th, 1839.

Edward Tilghman, Philadelphia, improvement in the form of Railway Bars, and the mode of fastening the same. Patented December 5th, 1839.

Edward Clarke, Saugerties, New-York, machine for separating corroded from uncorroded lead in the manufacture of carbonate of lead, (the white lead of commerce,) called "Clarke's Parting Apparatus." Patented December 5th, 1839.

Nicholas Turbutt, Fredericktown, Maryland, apparatus for arresting the sparks which usually escape through the chimney of a locomotive or other engine, called "Turbutt's Spark Catcher." Patented December 7th, 1839.

John Price, Nashville, Tennessee, Cotton Press. Patented December 7th, 1839.

Abner R. Ring, Parma, New-York, "Franklin Cooking Stove." Patented December 12th, 1839.

Orson M. Allaben, Middletown, New-York, machine for fractures of the lower extremities, called an Apparatus for Fractures. Patented December 12th, 1839.

Benjamin Bosworth, Fayette Co., Kentucky, improvement in the Bedstead. Patented December 14th, 1839.

William Reynolds, of Camden, S. C. instrument for supporting the abdomen, back, and perinæum called "Reynold's Gerenteron, or Visceral Supporter." Patented December 14th, 1839.

Joseph Rodefer, of Cincinnati, Ohio, mode of constructing Secret Interlocking Joint Bolts, for fastening bedsteads, &c. Patented December 18th, 1839.

Cornelius Bergen, Brooklyn, New-York, Silk Loom. Patented December 18th, 1839.

William W. Townsend, Shoreham, Vermont, Cheese Press. Patented December 18th, 1839.

John Price, Nashville, Tennessee, apparatus for burning Pine Knots. Patented December 18th, 1839.

George Smith, of Philadelphia, Pennsylvania, Door and Window Shutter Safety Spring Bolt. Patented December 18th, 1839.

Samuel W. Foster, Scio, Michigan, Smut Machine. Patented December 21st, 1839.

Abel Morrall, Studley, Kingdom of Great Britain, improvement in making Needles. Patented 21st December, 1839.

John P. Bakewell, Pittsburgh, Pennsylvania, Self Acting Safety Valve, for preventing steam boilers from bursting. Patented December 21st, 1839.

Frederick V. Barnard, Philadelphia, Pennsylvania, making Portable Houses. Patented December 21st, 1839.

Elisha Tolles, Hartford, Connecticut, Metallic Suspension Wheel for carriages. Patented December 27th, 1839.

Nathaniel Hebard, Dorchester, Massachusetts, Machinery for Dressing the Pulp, used in the manufacture of paper. Patented December 27th, 1839.

Britton M. Evans, Lancaster, Pennsylvania, improved Rail Road Chair, to dispense with the use of wedges. Patented December 27th, 1839.

Herrick Aiken, Franklin, New Hampshire, Socket for Holding Tools. Patented December 27th, 1839.

George D. Boyce, West Wareham Massachusetts, Cooking Stove.— Patented December 27th, 1839.

Herman Haupt, York, Pennsylvania, Bridge Truss. Patented December 27th, 1839.

William M. Hall, Wallingford, Connecticut, Self-Protecting Bee Hive. Patented December 27th, 1839.

Thomas Reaney, of Philadelphia, Pennsylvania, Spark Arrester. Patented December 28th, 1839.

Frederick P. Dimpfel, New-York, Revolving Fan Wheel, or Blowing Apparatus for Furnaces, &c. Patented December 28th, 1839.

Elisha Hale, Newburgh, New-York, Umbrellas and Parasols. Patented December 28th, 1839.

Horace Welles, Hartford, Connecticut, Coal Sifter. Patented December 31st, 1839.

Gerard Sickles, Middletown, Connecticut, Reel Box, for winding tapes and lines. Patented December 31st, 1839.

George S. Griggs, Roxbury, Massachusetts, Self-Acting Safety Brake, for railways. Patented December 31st, 1839.

Isaiah Jennings, New-York, combination of ingredients to be used as a substitute for Oil, &c. Patented December 31st, 1839.

George M. Johnson, Port Deposit, Maryland, Hat Coloring Machine. Patented December, 31st, 1839.

Lewis R. Palmer, Maryland, Otsego Co. New-York, machine for Changing Hides from one vat to another, in the operation of Tanning. Patented December 31st, 1839.

Ebenezer Barrows, Mattaposett, Plymouth Co. Massachusetts, Kitchen Ranges for cooking. Patented December 31st, 1839.

Manasseh Andrews, of Bridgewater, and *James Sproat*, Taunton, Massachusetts, mode of relieving the Collar of a Circular Saw, used for sawing boards, &c. from the friction occasioned by the pressure of the article sawed, as it is separated from the block upon the collar of the saw. Patented December 31st, 1839.

Thomas J. Butler, Johnstown, Pennsylvania, mode of cutting seats, slots, or groves for keys in the bore of hubs of wheels, and in the axles of rail road cars, and carriages of various descriptions, &c. &c. Patented December 31st, 1839.

Benjamin D. Beecher, of Prospect, Connecticut, manner of constructing and propelling boats, &c. by steam or other power. Patented December 31st, 1839.

Samuel N. Purse, and *Martin Staley*, of Ashley, Missouri, machine for preserving the equilibrium, or trim, of steam boats. Patented December 31, 1839.

Silas Day, and *Samuel Hall*, New-York, improvement in Fire Arms. Patented December 31, 1839.

Nathan Freeman, Lowell, Massachusetts, improvement in Wool Carding Machines. Patented December 31st, 1839.

Jos. C. Vaughan, and *Frederick Leach*, of Tioga, New-York, machine for manufacturing lead pipe. Patented December 31st, 1839.

John G. Lothrop, Provincetown, Massachusetts, Cooking Stoves. Patented December 31st, 1839.

Henry Waterman, New-York, Machine for Cutting Nails. Patented, December 31st, 1839.

List of Patents granted from January 1st to 15th, 1840.

Samuel S. Allen, Miamisburgh, Ohio, Horse Power. Patented January 10th, 1840.

Edwin Eastlack, of Greenwich, New Jersey, mode of disengaging horses from carriages, when in the act of running away. Patented January 10th, 1840.

Benjamin Benson, Smyrna, Delaware, improvement in Silk Cocoones. Patented January 10th, 1840.

Peter Getz, of Lancaster, Pennsylvania, Steam Cooking Stove. Patented January 11th, 1840.

William W. Bergstresser, Harrisburgh, Pennsylvania, improvement in Wheels for Railroad Cars. Patented January 11th, 1840.

Charles C. P. Crosby, Brooklyn, New-York, Evaporating Kettles. Patented January 11th, 1840.

Samuel S. Allen, Miamisburgh, Ohio, machine for Husking and Hulling Corn. Patented January 15th, 1840.

Mathew W. King, New-York, improvement in wheels for Propelling Boats. Patented January 15th, 1840.

Aaron Ball, Caroline, New-York, machine for cleaning grain from smut; cooling, conveying, and bolting flour. Patented January 16th, 1840.

DESCRIPTION OF PATENTS.

Spark Catcher. By NICHOLAS TURBUTT.

This Spark Catcher consists of a circular grating, over which is placed an inverted funnel, whose smaller end is continued upward at a uniform diameter as high as the ordinary chimney, around which is placed a circular case resting on legs, on a circular horizontal plate fastened to the outside of the funnel; upon which plate is placed another circular case or rim, concentric with the others, but not touching them, open at the upper end. The middle case, surrounding the flue, is closed at the upper end, and open at the lower end; the plate which closes the upper end, however, is raised above the top of the flue sufficiently high to allow the smoke to pass over the top; it then descends along the space between the middle case and flue, passes under the lower end, and ascends between this case and the outer case or rim to the atmosphere, the sparks falling on the circular plate, from whence they are removed through a door in the same.

The claim is to the arrangement of the grate, inverted funnel, circular plate and rim around the same, in combination with the ordinary chimney and case for arresting sparks.

Improvement in the Franklin Cooking Stove. By ABNER R. RING.

This stove consists of a Franklin with a Cooking Stove attached to the same behind, into which the smoke and heat from the Franklin fireplace may be turned at pleasure, when culinary operations are desired to be performed, by having a part of the back of the Franklin to turn on an horizontal rod, passing through the sides thereof, by which a communication or draft is opened to the Cooking Stove, at the same time closing the front and opening the back part of the funnel of the Franklin, by means of a swinging damper, the smoke and heat being caused to pass down, in front of, under, and up behind and over a large square oven, and then through apertures in a sliding register behind the Franklin, and into the funnel which conveys it to the chimney. In passing over the oven it also passes under boilers in the top plate of the Cooking Stove. The smoke can also be directed immediately from the Franklin to the boilers, without passing under the oven by means of the registers; and should the heat not be sufficient for the operations of cooking, an extra fire can be made in the space over the oven and under the boilers, the smoke passing directly through the registers into the funnel. When the cooking apparatus is not used, the dampers

in the back of the Franklin and in the funnel are turned, which will cause the smoke to ascend in the Franklin in the usual manner.

The invention claimed consists in the combination of the damper in the back plate of the Franklin with the register plates or valves arranged and operating as described, by means of which the draft is carried down under the oven, and in connection therewith, the constructing the back plate of the boiler chamber with apertures, so as to admit of the draft passing under the boilers after it has circulated under the oven, and escaping in front through the apertures governed by the outer register into the main flue or double pipe.

Also the combination of the apertures in the back plate of the boiler chamber with the valves or registers, by means of which arrangement the inner register being closed, the boiler chamber may be employed as a chamber of combustion; the draft passing through the aforesaid apertures into the back flue formed by the back plate of the Franklin, and the front plate of the oven and boiler chamber, into the main flue or pipe.

Improvements in Supporters for the Abdomen, Perinæum, &c., called the Gerenteron. By WILLIAM REYNOLDS.

This improvement consists in making the front pad, or supporter of the abdomen, in two parts, united by broad straps and buckles, which can be let out as gestation progresses, without the necessity of procuring other pads to suit the size of the abdomen, during its progressive changes; which pads are united to the back pad by two curved springs passing over the hips in such manner as to impart to the apparatus a vertically lifting as well as an horizontal action; and also in making the back pad with a vertical hinge in the centre, that it may conform to any sized or shaped back, whether still or in action; and in making the lower part of the pad plate concave so as to preserve the spinal column from injury.

Likewise in constructing the pad for the support of the perinæum, with an elliptic spring in the centre, that shall be compressed into a small compass, and remove the hardness and inconvenience of the pad to the wearer in sitting down, which is experienced in the use of the common pad without such a spring.

Also in combining with the straps which attach the perinæum pad to the back and front pads, certain coiled springs for making the straps more elastic or yielding.

The invention claimed consists

1st. In constructing the back pad plate a little raised on each side of the centre, so as to form a recess on the under side that the spine may be safely lodged therein, in combination with the vertical hinge in the centre, permitting each side to fold down so as readily to adapt itself on each side of the spine to any shape of the back, as before described.

2d. The combination of the hip springs constructed and arranged as herein described, with the front and back pad, the whole being arranged and operating in the manner set forth.

3d. The mode of adjusting the hip springs by means of the clasps and pins on the front pads as described.

4th. The mode of adjusting the front pads so as to adapt them to any sized abdomen by the means described, or any other mode substantially the same.

5th. The construction of the pad for supporting the perinæum, with an elliptic spring in the centre as described.

Be it known that I, Samuel W. Foster, of Scio, in the county of Washtenaw, State of Michigan, have invented a new and useful improvement, in the machine for cleaning grain, called

"Foster's Improved Smut Machine."

which is described as follows :—

This machine is an improvement on Yates' Smut Machine, patented during the present year 1839.

The moving part of this machine is described as follows :

It consists of a vertical shaft about four feet long, and six inches in diameter, with a steel pointed gudgeon in the lower end, and a common cast iron gudgeon in the upper end; two arms are put through the shaft near the middle, and notched together and keyed tight; these arms are three feet and two inches long and twelve inches wide; but are notched in the lower side one inch and a half deep, extending from the centre towards each end eleven inches. These arms are made of plank, one inch and a half thick, and the upper side is cut away so as to be three quarters of an inch thinner than the lower side, the slanting side of the arm being brought to a plane surface. This slant on the arm is made on opposite sides of the shaft, so that each arm, when it strikes the wheat, will have a tendency to elevate it as well as to throw it horizontally forward. A circle of plank one inch and a half thick, the diameter of which is equal to the length of the notches cut out of the arms on the lower side, which circle is now nailed on to the under side of the arms. A circular rim of plank, two inches thick and eight inches wide, the diameter of which is equal to the whole length of the arm (38 inches) is nailed on to the lower sides of the arms. The slanting side of the arms (which first strike the grain) are covered with sheet iron, and the under side of the circle and rim mentioned are also covered with sheet iron, and the outer edge of the rim is also covered with sheet iron, and filled with small nails, driven in close together, and projecting from the surface of the iron about half an inch. There are three small pieces of wood nailed on to the bottom of the first mentioned circle, and against these are nailed small pieces of leather, in such a manner as to strike the grains of wheat, and prevent any of it from falling down around the shaft, the centrifugal motion throwing the grain from the centre toward the periphery. On the shaft about a foot from the lower end, is a whur, five inches thick and twelve inches diameter, around which is passed a band for propelling the machine.

The frame work, or immoveable part of the machine, is constructed as follows :—

There are six posts, four of them about four feet long, and two of them about five feet long, three inches by four; in the lower end of the

longest posts (which in the frame are opposite each other) there is a mortise in each an inch and an half by six inches ; in these mortises rest the ends of a piece of timber on which stands the lower end of the shaft ; in this timber is placed a cast iron box with a steel step in it to hold oil around the gudgeon. About two feet from the lower end of the posts there are six curved girts framed in, three inches square and seventeen and an half inches above these girts is the upper side of another tier of girts, two inches by three inches ; on the lower girts is laid a circular floor of plank, two inches thick, with a hole in the centre, thirteen inches diameter. Around this hole on the upper side of the floor is fastened, a circular rim of plank, two inches thick, and four inches wide, the top of this rim is covered with sheet iron projecting one fourth of an inch over and beyond the periphery of the wooden rim to assist in preventing the wheat from flying down around the shaft.

Within this hole and around the outside of it is nailed a piece of leather, extending around and above the hole, three fourths of an inch ; this piece of leather, and the last mentioned piece of sheet iron, and the small pieces of leather and wood nailed on to the moving part of the machine, together with the projection of the last mentioned rim of plank, and the cavity or countersink on the moving part or disc, to receive it effectually and prevent the wheat from wasting around the shaft. The floor, and the outside of the last mentioned rim, is covered with sheet iron, and driven full of nails projecting from the sheet iron about half an inch. Around the outside of the arms or wings is a covering of sheet iron nailed on to the inside of the posts seventeen and an half inches wide, and nailed to the inside of the upper and lower tier of curved girts. A covering is then put over the top of the arms or wings, resting on the upper tier of girts, made of inch boards, with sheet iron on the lower side, and filled with nails, driven in near together, and projecting down about half an inch. The wheat is let into the machine through an opening in the top cover, and is discharged at the bottom through a spout, which must be placed in the bottom of the machine, a little to the right or left from the spout through which the grain is admitted, according as the machine runs to the right or left. A cap is placed on the top of the two long posts in which is fixed a wooded box for the upper gudgeon to run in.

In operating with this machine the wings not only throw the grain against the inside of the circular case, in breaking the smut from the grain, but they also drive the dust through the apertures in the circular case, whilst the clean grain falls down through the spout below.

The invention claimed and desired to be secured, by letters patent, consists in constructing the floor of the cylinder with a rim or collar around the shaft, for the purpose of preventing the grain from passing out between the shaft and cylinder, and, in combination therewith, adapting the disc to the aforesaid rim or collar, by countersinking it in the manner herein described, by which means a trough or channel is formed for the grain, in which it is retained and operated upon with more effect than if the bottom of the cylinder were a perfect plane.

Also the arrangement of the strips of wood and pieces of leather

on the under side of the disc for throwing the grain from the centre toward the periphery of the disc, as described.

SAMUEL W. FOSTER.

EDWARD MAHER, }
WILLIAM P. ELLIOTT, } *Witnesses.*

Mode of constructing Portable Houses for Transportation.

BY FREDERICK S. BARNARD.

This improvement consists in preparing the sides, ends, floors, roof, &c. of the house in single pieces, fitted and ready for putting up in any situation desired. The sides and ends are composed of boards planed, tongued and grooved and fastened together by cross-pieces to which they are nailed, leaving suitable openings for the doors and windows. The floors and roof are made in a similar manner. The whole is then painted. It is proposed by the Patentee to make them by machinery in the Atlantic cities, and transport them by our canals, lakes and rivers to the west, for the use of emigrants, where mechanics are difficult to be procured; the parts being so constructed that any one, whether a mechanic or farmer, or other person, can put them together and erect for himself and family a dwelling in a few hours, possessing convenience, strength and beauty.

The invention claimed, consists in the mode of constructing portable buildings, that is to say in completing the sides, ends, floors, roofs, &c. separately and completely finished, to be put together, as herein described, without the aid of a regular mechanic.

Polishing the Eyes of Needles. BY A. MORRALL.

This invention consists in stringing the needles on rods, covered with emery, or on small round files, arranged in a revolving wheel which is made to receive a rotary motion, which imparts to the needles a rotary as well as a vibratory movement on the files, by which the eyes are made smooth.

Tool Holder. BY HERRICK AIKEN.

This improvement consists in making a gripe in two or more parts, between which the tool is held, made larger at one end than at the other, leaving a screw cut on the smaller end, which screws into a nut secured at the bottom of a socket in the ordinary handle, and conical at the larger end, so that by screwing the gripe into the nut, the conical end is drawn against the sides of the socket and forced to gripe and hold the tool firmly.

The invention claimed, consists in making the gripe with one end conical, and fitted to the outer end of the socket, and the other end provided with a screw fitted to a female screw in the other end of the socket, secured in the handle in the manner and for the purpose described; and this is claimed whether the gripe be made in two or more pieces, or in one piece and slit.

Coal Sifter. BY HORACE WELLS.

This improvement consists in providing a case a little wider than the ash draw, about one third longer and higher, with a screen inside extending about two thirds its length, and placed above the bottom about the depth of the draw, or a little more, composed of wire, or perforated sheet iron. This case is placed in a horizontal position, when the draw, filled with ashes and coals, is inserted. It is then turned over and shaken, which causes the ashes to pass through the screen whilst the coals are held in the draw. The case is then raised to an angle of about fifty degrees, which causes the ashes to slide down to the end of the case; the case is then turned over and the pan drawn out with the sifted coal. The ashes are discharged by resting the open end of the case upon the floor, and elevating the other end.

The claim is to the combination of the box or case, with the draw or ash pan.

Reel Box, for winding lines, &c. BY G. SICKLES.

This consists of a tin cylinder, on which the line is to be wound, turned by a crank or handle attached to it, in a hollow cylindrical case, of a diameter sufficient to contain the reel and cord wound thereon. It operates on the same principle as the common tape winding apparatus used for measuring.

Machine for handling or shifting Hides from one vat to another, and expressing the exhausted liquors therefrom. BY LEWIS R. PALMER.

This machine consists of two posts mortised, and tenoned, and braced into two horizontal parallel sills; between which posts turns an horizontal cylinder, by a crank; upon which cylinder turn a number of rollers on an axle lying parallel with the axis of the cylinder, passed through holes in the centres of the rollers and through the posts; which holes are made larger in diameter than the diameter of the axle passing through them, in order to allow the rollers to rise and fall in conforming to the inequalities of the surfaces of the hides passed between said rollers and the cylinder. The operation of the machine is as follows. Pass the end of the hide between the cylinder and rollers, turn the cylinder, this will draw the hide from the vat on one side, and drop it into another vat on the other side, the rollers (being made sufficiently heavy) serving to press the exhausted liquor from the hide, and thus prepare it to receive a fresh liquor from another vat into which the hide is delivered on the other side of the machine.

The invention claimed consists in the combination and arrangement of the parallel loose revolving rollers with the revolving cylinder placed below the same, between which the hides are drawn for pressing the exhausted liquors therefrom in the process of tanning leather.

Improvement in Fire Arms. BY DAY & HALL.

The charge is contained in a metallic thimble, primed or capped, and inserted at the breech of the piece in the manner of Fay's patented gun, with some slight improvements.

Be it known that I, EDWIN EASTLACK, of the township of Greenwich, in the county of Cumberland, and state of New Jersey, have invented a new and useful improvement in Harness and Carriages, to prevent accidents from the running away of the horses, called

"The improved Safety Harness and Carriage,"

which is described as follows :

The nature of my invention consists in so constructing the traces, each one being in two parts connected together by spring bolts, whilst the horse is drawing the vehicle at an ordinary speed, and held thus by a clasp, which clasp (when the horse runs away) is drawn back by the driver by means of a cord attached to it leading inside the carriage and laid hold of by him, which suffers the springbolts to fly asunder from the traces, which are thus separated, leaving the parts attached to the swingle-tree behind with the carriage, whilst the horse takes with him the rest of the harness ; the tugs being so constructed with metallic plates, pin and roller, as to slip over the shafts or thills without any impediment, and also in having a pinion attached to the perch working into a cogged segment fastened to the forward axle-tree, which pinion is turned by a lever inside the carriage, for the purpose of steering the carriage after the horse is disengaged therefrom.

And, likewise, in the construction and application of a double clamp break, which is made to embrace the hubs by means of a combination of levers and rods placed under the carriage body, and operated by the driver by means of one of the levers which extends inside the carriage, for the purpose of gradually arresting the motion of the carriage, also, in constructing the ends of the swingle-trees with spring-bolts, cords and pulleys for disengaging the traces from the ends thereof, instead of separating the traces as before mentioned.

The disengaging apparatus.—The traces are made in the following manner : each trace is made in two parts ; one part being of greater length than the other part ; one end of the longer part is attached to the hame in the usual manner, and is called the hame trace ; to the other end is secured a metallic bale, having one of its sides open to admit one end of the short part of the trace called the swingle-tree trace, through which and the sides of said bale are made perforations corresponding with each other when the hame trace is inserted, and into which bale are inserted two pins fastened to the ends of two springs, secured to the end of the short part of the trace by rivets passing through the springs and trace and the swingle-tree part of the trace, and when thus inserted in the bale and the springs contracted so as to cause the pins to pass through them, are held by a rectangular sliding clasp attached to the end of a cord leading inside of the carriage for the driver to lay hold of and draw by, when the clasp is to be removed for disengaging the parts of the trace. The other end of the short part of the trace is attached to the end of the swingle-tree in the usual manner. The other trace on the opposite side being similarly constructed and applied, need not therefore be described. A description of one of them answering for the other.

The short reins are held on the saddle hook, by means of a spring

fastened to the saddle and pressing against the hook which keeps them from slipping off.

The tug irons are made each from a flat plate in an oval shape, forming a loop attached to the lower end of the tug strap; they embrace the shafts or thills. In this curved plate is placed a roller, turning on a pin passing through the sides of said oval or curved loop; this roller works against the shaft hook by which the carriage is held back; the breeching being attached to the tug irons by a strap leading from said tug irons to the breeching ring. By this construction of tug irons, the harness is at once liberated from the thills or shafts as soon as the parts of the traces are separated by drawing the clasp from the springs.

The steering apparatus.—The cogged segment for steering or guiding the carriage is secured to the forward axle-tree, by letting both its ends into the same, the cogs being toward the hind axle-tree works, below the perch. The pinion which works into said cogged segment is also placed below the perch, its axle passing vertically through the same, to which is fastened an horizontal arm, to this a vertical rod, and to the upper end of this an horizontal handle for turning the cog wheel, in steering or guiding the carriage when the horse is liberated.

Apparatus for arresting the motion of the carriage.—The double clamp break for arresting the motion of the carriage consists of two levers moving on fulcra, on one side of the hind axle-tree, to the short end of which levers segment collars or semicircular rings are fastened, which partly embrace the hind hubs, and to the long ends of said levers which are connected together by a moveable joint, is attached a horizontal rod moving vertically over the perch. It turns up vertically, and passes through the bottom of the carriage to which a handle is fastened for moving it. On the opposite side of the hind axle-tree, and lying parallel with it, is placed on a bar moving in mortises, in two horizontal supports and guides inserted horizontally into the axle-tree, which bar is attached to, and moves with, the levers in the same direction, by means of links which connect them together, and to the ends of said bar are fastened two segments or semi-circular collars, which also partly embrace the hubs on the opposite side, are designed to accomplish the same purpose as those just mentioned; namely, to produce friction on the hubs for stopping the motion of the carriage.

Operation.—When the horse runs away, the driver pulls the cord, which draws the clasp from the springs, which instantly fly asunder in extending themselves, drawing the bolts or pins from the end of the traces, the cord being branched so as to move both clasps at the same time; the traces being thus separated, the driver throws the reins out of the carriage, which are carried off by the horse, along with all the harness except the short pieces of the traces which remain on the swingle-tree, with the springs, clasps, and cord attached to them.

The shafts being held up by suitable straps or by the driver holding the cord, and the carriage continuing to move onward from its momentum, must be guided by the driver, which is done by his laying hold of the handle and turning the pinion, which moves the segment and this the forward axle-tree, and thus guides or steers the carriage.

He then gradually stops its motion by laying hold of the handle of the brake, and, moving it vertically, moves the long ends of the levers

in the same direction, and the short ends in a contrary direction or toward the axle-tree, causing the segment collars to partly embrace the hubs and produce friction thereon. At the same time the segment collars on the opposite side are brought hard against the hubs by means of their connection with said levers by the parallel bar and links, and thus the friction on the hind hubs is increased to such a degree as to gradually arrest the motion of the carriage at the pleasure of the driver.

The swingle-tree may be so constructed and used as to effect the object of suddenly disengaging the horse from the carriage, in the act of running away, instead of dividing the traces, the horse carrying away with him both traces. To effect this object, the swingle-tree must be constructed with a sliding bolt at each end, to which bolt the trace is hooked; said sliding bolt is held in an extended position by a spiral spring surrounding it, the outer end of said bolt passing through apertures in a metallic box fastened on the end of the swingle-tree, for strengthening it, and for preventing the traces slipping off whilst drawing the carriage, and to the inner end of the bolt is attached a cord, passing round a pulley in the swingle-tree and running thence to the inside of the carriage near the driver; the other end of the swingle-tree is similarly provided with a sliding bolt, spring, cord, and pulley, which cord after passing over the pulley unites with the first mentioned cord, so that when the main branch is pulled by the driver, both bolts are drawn at the same time toward each other, and both traces disengaged simultaneously, and both spiral springs contracted, which as soon as the cord is again loosened, extend themselves by the exertion of the contracted springs, to extend themselves, thus driving the bolt out again ready to receive and hold the ends of the traces, which must be hooked over the bolts by hand. The outer plate of the metallic box, into which the end of the bolt enters, not only serves to prevent the bolt from bending or breaking, but it also prevents the traces from slipping off until the bolt is drawn therefrom.

What I claim as my invention, and which I desire to secure by letters patent, consists:

1. The combination of the spring bolts, hales, clasps, and cord, with the divided traces for disengaging a horse in the act of running away from a carriage as before described.

2. The iron tug in combination with the roller, as herein described to prevent the shafts from hanging in the tugs when the horse is liberated.

3. The combination and arrangement of the levers, rods, and semi-circular collars, for gradually arresting the motion of the carriage in the manner herein set forth; the *principle*, however, of arresting carriages by means of brakes applied to the hubs, is not claimed.

4. The combined sliding bolts, spiral springs, cords, and pulleys in combination with the swingle-tree for disengaging the traces therefrom, as described.

EDWIN EASTLACK.

Improvement in the Silk Cocoonery. BY B. BENSON.

This improvement consists in making use of an endless apron, passed under the hurdles and over rollers, in such a manner that by turning

the rollers the apron is moved under all the hurdles at the same time and discharges the filth at the ends of the hurdle frame. It is an improvement on Gray's patent.

Be it known, that I, AARON BULL, of Caroline, Tompkins County, state of New-York, have invented a new and useful *machine for cleaning smut from grain, elevating grain, flour, &c. and cooling flour*, which is described as follows:

This machine when used as a smut machine consists of an inclined hollow trunk of suitable length, breadth, and height, closed at both ends; the top perforated with a number of oblong apertures for the escape of smut and dirt, and for the admission of the grain; over one of which openings at the lower end the hopper is placed. On the bottom of the trunk are arranged a number of inclined planes at suitable distances apart, inclined at an angle of about ten or fifteen degrees with the bottom, and extending nearly to the top, and then turning down and back in a curved line, so as to form a concave for a revolving fan to turn in.

Under the hopper, and also at the elevated end of each inclined plane, except the upper one, is placed a revolving fan, the axles of which extend horizontally through the sides of the trunk, sufficiently far to receive pulleys for bands leading from the driving power (manual, horse, or steam) by which they are turned.

The upper inclined plane has no fan, but there is an opening in the bottom of the trunk at the lower extremity of the upper concave, through which opening the cleaned grain descends into a spout placed below it, which conducts it wherever desired. The upper end of the trunk, when of sufficient length to prevent the current of air driving the grain out, may be left open. The apertures in the top are provided with slides for closing or opening them at pleasure, being left open when used as a smut machine, and closed when used as a flour cooler.

In cleaning smut from grain, the grain is put into the hopper from whence it descends to the trunk; it is there met by the wings of the first fan, carried round and driven along the trunk until it meets the first inclined plane, against which it is driven with violence, which breaks the smut from it and is driven out of the trunk through the aperture in the top, whilst the grain falls over the ends of the inclined plane on to the second wheel, which is sheltered from the current of the first wheel by the rising of the inclined plane; the second wheel drives the grain against the second inclined plane, where the grain is treated in a similar manner, and so on until thoroughly cleaned, when it falls over the end of the last inclined plane and passes through the aperture in the bottom to the spout, which conducts it away to any place desired.

For simply conveying grain the apertures in the top may be closed by the slides, and the elevated end of the trunk be left open.

In both operations the machine should be placed in an inclined position, say at an angle of about ten or fifteen degrees with the horizon. It may, however, be placed in a horizontal position for some purposes.

In using the machine for cooling flour, preparatory to bolting it, the flour should be conducted from the stones, or other place by a spout,

into the trunk through an aperture in the top and thence driven into the bolt by the revolving fan. The bolt is made like others in use; also the grinding stones. The inclined planes and second fan are omitted, and the openings closed. The flour may be partially bolted by means of this machine, in a large close room by means of the current of air driving the finer flour out at the end of the trunk, and sending it to a greater distance therefrom, whilst the coarser flour being the heaviest will settle sooner and near the end of the trunk, and thus the flour may be partially bolted without the revolving bolt, in which case the apertures in the top, and the apertures in the bottom must be closed and the end left open.

When the machine is used for scouring wheat, the trunk must be made long enough to prevent the current of air from driving the grain out at the end of the trunk; the grain being made to fall over the last inclined plane above, and pass out at the opening in the bottom of the trunk.

What I claim as my invention, and desire to secure by letters patent, is the before described mode of cleaning, scouring, and conveying grain, and cooling, bolting and conveying flour by a current of air produced by revolving fans, arranged in an horizontal or inclined trunk, containing inclined planes, for breaking the smut, and sheltering the forward wheels from the current of air and apertures for the escape of the smut, and apertures for the passage of the grain, flour, &c. as described; the current of air being produced in the manner above described, or in any other mode substantially the same.

AARON BULL.

ED. MAHER, }
CALVIN BETTS, } *Witnesses.*